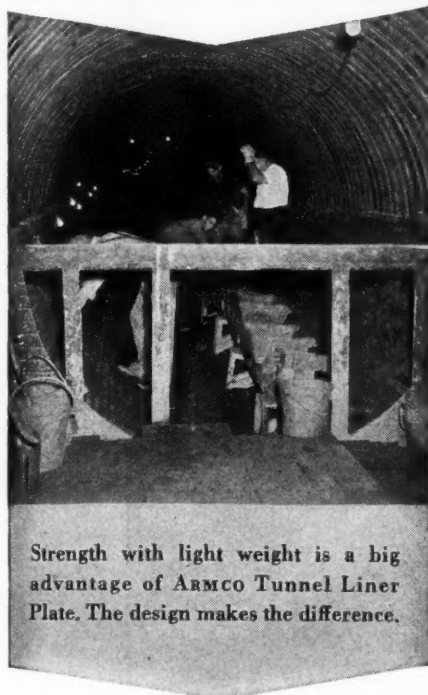


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VOL. 72. NO. 10

A. PRESCOTT FOLWELL, Editor

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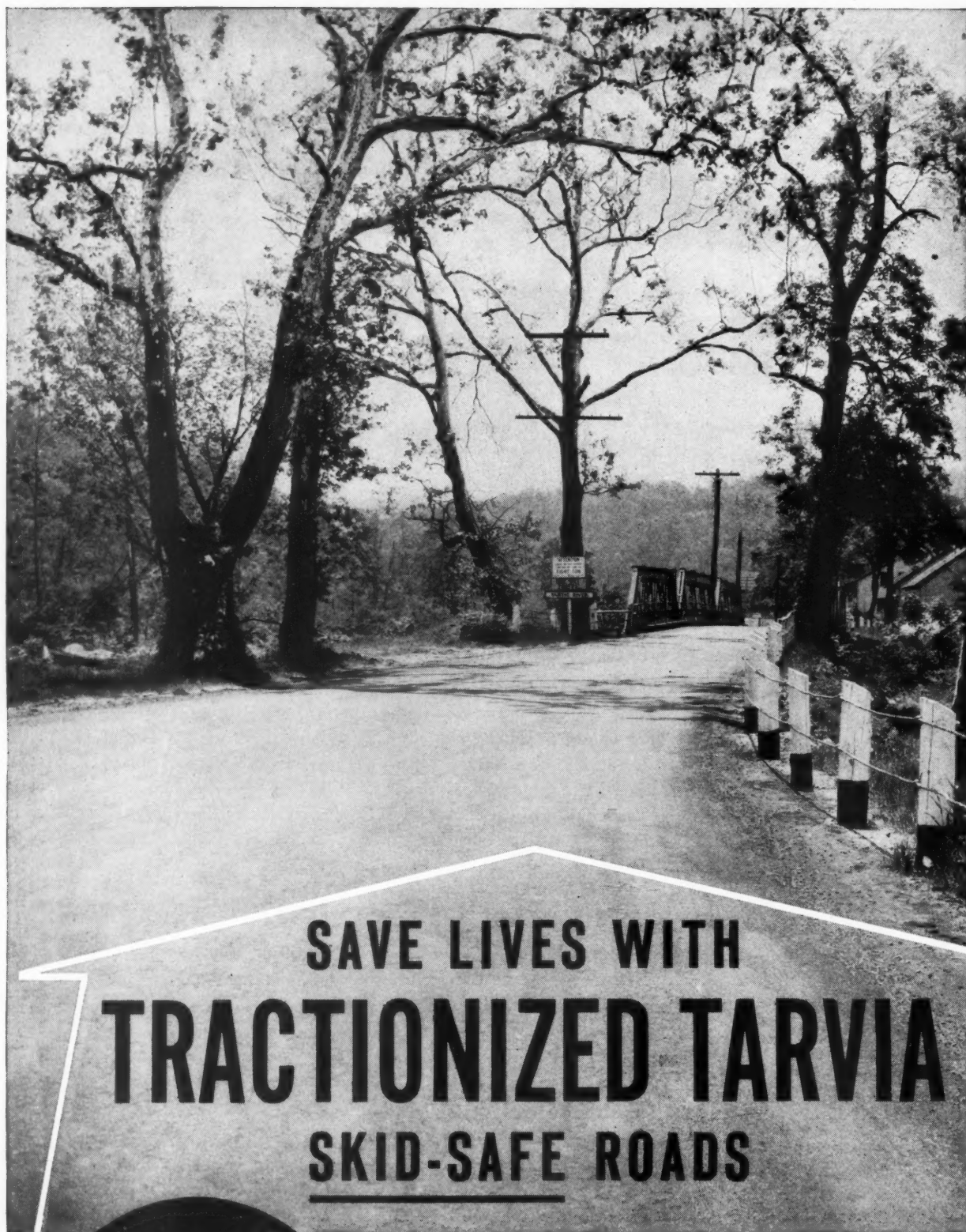
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The Editor's Page

Obtaining "Critical" and "Sub-Critical" Materials

Last month we called attention to the desirability of putting public utility plants into good condition as a preparation for meeting coming emergencies. We illustrated this by reference to water works only, but it applies to other utilities also, such as sewerage systems and supplying of electric power, gas and central heating. Repairs and extensions of these that are known to be needed *now* should be attended to at once. Sewers that need cleaning should be restored to their full capacity; treatment plants that are overloaded should be enlarged; sewage pumps should be put in prime condition, including stand-by equipment, and if there is not sufficient of the latter to meet any emergencies it should be installed.

This may mean the purchasing of new equipment and materials, and some of these it may be difficult to obtain because of the "critical" materials entering into them. The O.P.M. (Office of Production Management) recognizes the importance of these public utilities and has provided means whereby they will be given priority over less important users of such materials. How managers of such utilities may avail themselves of such preferential treatment is explained on page 46 of this issue. This contains the latest information reaching us to the date of publication, but modifications are being made from time to time as the procedure is developed. That the latest information and additional instructions may be obtained, we give a list of the 16 field offices of the OPM (21 more are in process of organization) to which application can be made.

It is possible that, as the preparedness program develops in magnitude, the regulations may be made more stringent, and we urge all public utility managers to attend to this matter at once.

We Must Be Sure to Maintain the Roads We Have

One rarely gets out on a road these days without meeting some Army trucks; statistics and our own troubles in traffic tell us that the highways today are carrying the heaviest loads in their history. And these loads are not likely to decrease in the near future; rather, we can confidently expect traffic volume to grow heavier.

Priorities and shortage of certain materials, as well as the tendency to spend more and more of our money in seemingly more essential lines, may reduce the volume of road construction. We hope not, but it may. But whether it does or not, the men responsible for the highway systems of our states, counties and cities—elective as well as technical officials—must use every possible effort to provide the men, money and materials to keep the highways and streets we now have in the finest possible condition. The old adage of the stitch in time never was more applicable. As sturdy

and solid as our highways appear to the uninformed, they are dependent for their efficient usefulness on day-by-day maintenance. Timely patching, careful and intelligent drainage and subdrainage, and prompt resurfacing when needed are basic essentials in protecting our highways and in preserving their usefulness throughout the years.

Right now, with winter coming on, is a good time to plan your maintenance campaign, to check your supply of essential maintenance materials and to add the needed equipment, including sand spreaders, tar kettles, bituminous distributors, rollers, etc. And since snow removal is an important item in winter maintenance, how about your supply of snow plows? Is it adequate in number and in condition to serve through a severe winter?

Good Sense and Sanitation in Garbage Disposal

Unless all signs fail, this country will soon be in a position where some nearsighted gentlemen will insist on saving the food values in garbage by feeding it to hogs. If they succeed in their efforts we will be afflicted with hog farms with their attendant insanitation and heavy fly production for the sake of recovering perhaps 50 cents worth, per ton, of food values; while, in the name of sanitation, several thousand dollars will be spent to correct other and no worse conditions in the same general area.

Perhaps the above statement sounds a little incoherent; no doubt it is, for anyone just returning from the average farm operated to turn garbage into hogs is apt to be incoherent. Conditions are that way.

People who have never seen a hog farm and *do not have to live near one* may jump at the idea that it will be patriotic to utilize all of our food wastes in such a manner and will put on a pressure campaign. But it isn't a simple matter to feed garbage to hogs properly. To do a fairly good job there are certain essentials: There should be 50 to 75 hogs per ton of garbage; an acre of land should be provided per each 50 hogs; the farm should be 5 to 10 miles outside the city; well-designed feeding platforms are necessary; water under pressure must be available to clean the platforms daily and this waste water must be disposed of properly; and the inedible wastes, which amount to 40% to 50% of the original volume of garbage, must be removed and disposed of daily and in a sanitary manner.

We hope our city and village officials will weigh what it will cost the community in sanitation and health against the gain to be derived from utilizing garbage for hog food. We believe that garbage disposal by properly designed and operated high-temperature incinerators is the most sanitary and satisfactory method; and that the welfare and comfort of a community are of far greater value than the 40 pounds of pork that can be raised on a ton of garbage.

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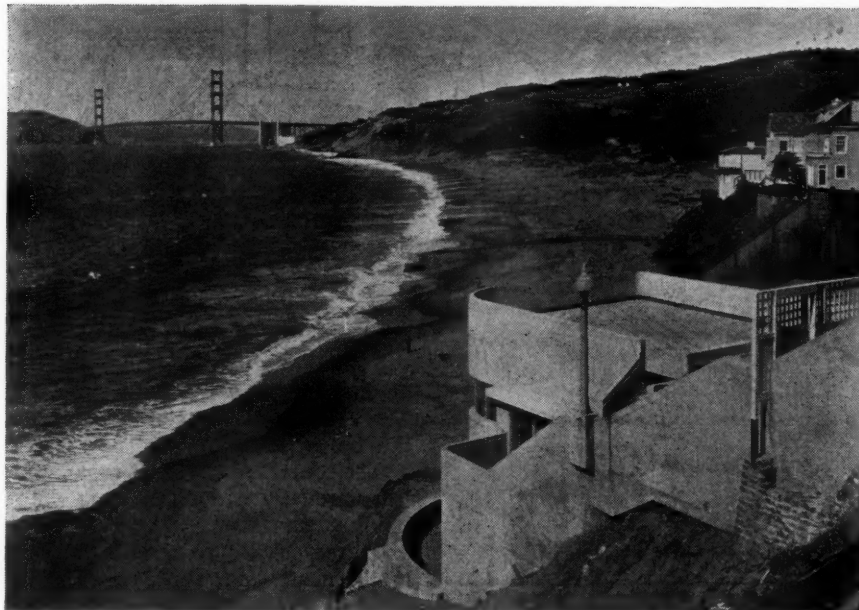
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View of Baker's Beach; pumping station at right foreground

New Pumping Station Protects Bathing Zone from Contamination

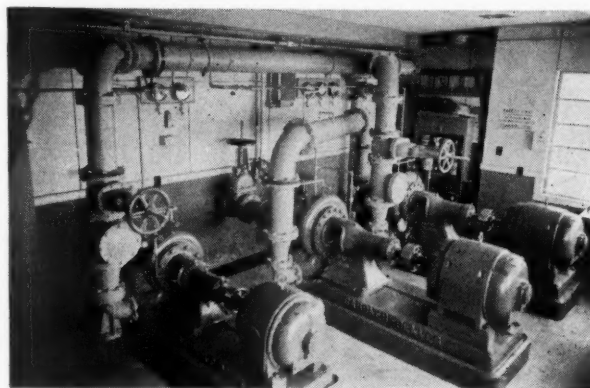
By JOHN J. CASEY,
City Engineer, San Francisco, Calif.

SEWAGE pollution has been removed from Baker's Beach on the South Bay at the entrance to the famous Golden Gate by the construction of a modern pumping station. This beach is sure to become one of San Francisco's most popular recreational beaches, as it is well protected from heavy tidal action. As a result of the diversion and treatment of sewage, a clean, smooth sandy beach now invites recreational opportunities, where formerly there was filth of a nauseating character.

The sewage from the contiguous Sea Cliff residential district, comprising 93 acres, with a population of approximately 2500 people, is pumped through a 1700-foot force main to the existing Richmond sewer tunnel. This sewage, together with sewage from the adjacent Richmond district, which formerly was discharged at Baker's Beach, is now treated and disinfected at the Richmond-Sunset sewage treatment plant, located in the southwest corner of Golden Gate Park. (Described in Public Works for September, 1939.)

The pumping station building is of reinforced concrete, and as plywood was used for the forms for the

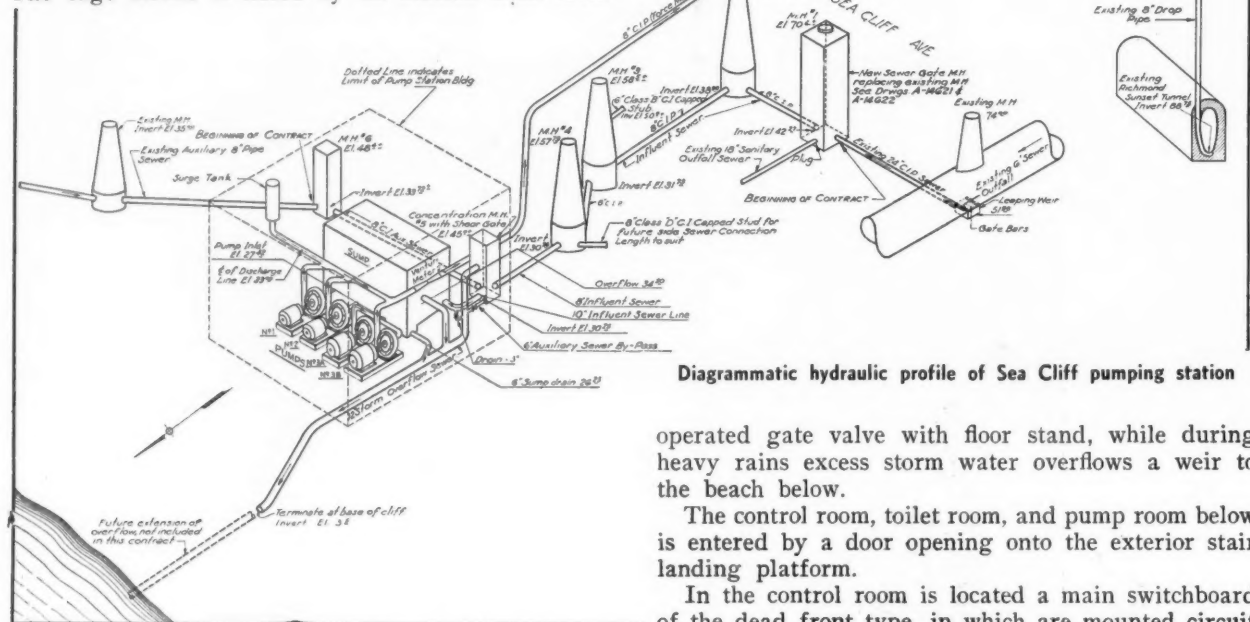
exterior surfaces, a smooth natural concrete finish was obtained. It is located at the rear of a lot half way up the cliff above Baker's Beach, with sidewalk access from Sea Cliff Avenue near 26th Avenue. The front of the lot is landscaped with plants of two varieties.



A corner of the pump room

Entrance to the station is by a long, concrete stairway with intermediate landings. At the bottom of the entrance stairway is a landing platform, permitting entrance to the sump room or to the control room.

Below the sump room floor is the sump, into which the sewage enters after passing through a cage screen. The cage screen is lifted by an electric hoist from



Diagrammatic hydraulic profile of Sea Cliff pumping station

operated gate valve with floor stand, while during heavy rains excess storm water overflows a weir to the beach below.

The control room, toilet room, and pump room below is entered by a door opening onto the exterior stair landing platform.

In the control room is located a main switchboard of the dead front type, in which are mounted circuit breakers, metering instruments, control switches, motor starters, time switches, relays and recorders for flow meter and pressure gauge.

A stairway leads to the pump room below, in which are located two 4-in. horizontal-type centrifugal sewage pumps, and two 5-in. pumps connected to form a series pumping unit. A separate water system, consisting of makeup tank, two turbine-type centrifugal pumps, and pneumatic water tank, supplies sealing water to the stuffing box of each pump, to the flow meter and to the shredder. Compressed air is supplied by a single-stage compressor driven by a motor through a "V" belt.

Below a suspended ceiling, consisting of acoustical celotex concrete tile above the pumps, are mounted two I-Beams, on which is installed a hand travelling crane of 1½-ton capacity. The walls of the control and pump rooms are finished with celotex building board insulation, and are heated by electric unit heaters, so arranged as to draw in a small quantity of fresh air and then mix it with recirculated room air. The heaters are thermostatically controlled in each room.

A manually operated vent-louvre in the wall of the control room on the leeward side of the building allows a constant escape of air.

In the discharge header is located a short-tube venturi meter for registering the rate and total quantity of sewage pumped. The differential in pressure is transmitted through piping and settling chambers

(Continued on page 22)



View of pumping station from beach



Sketch of the Pennsylvania Railroad grade separation project, Louisville

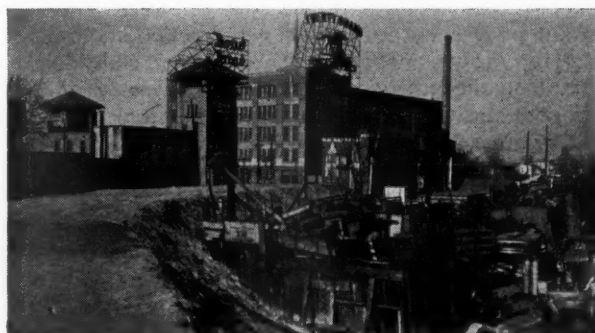
Railroad Grade Separation at Louisville, Kentucky

By J. B. WILSON

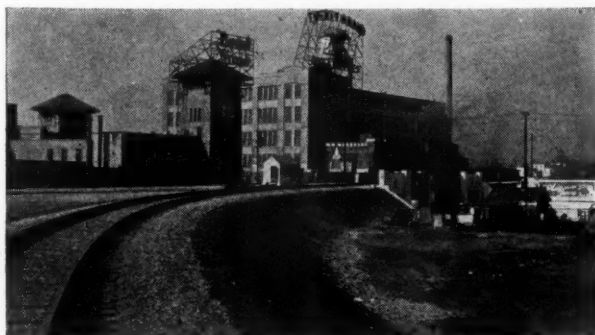
Chief Engineer, Dep't of Public Works, Louisville, Ky.

A PWA project costing over \$2,000,000 by which ten grade crossings were eliminated. A general description of the physical structures involved.

THE separation of streets and railroads crossing at grade had been given little consideration by the city of Louisville, Kentucky, prior to 1936. With the exception of a half dozen subways of the Kentucky and Indiana Terminal Railroad Company in the west end of the city, and one grade separation on the Southern Railway and the Louisville and Nashville Railroad Company in the south end of the city, nothing had been done with the problem. However, with the advent of the Public Works Administration and the Hayden-Cartwright Act, in which certain funds became available in the form of either a grant or outright gift from the United States Government, steps were taken



South of the Broadway subway before work started



South of Broadway subway after completion in 1941

by the city to accomplish some of the more important grade elimination projects which had been hoped for but were beyond realization. Anticipating a future general grade elimination program throughout Louisville, the city approved a \$5,000,000 forty-year bond issue and was prepared to join with the government and the railroads in any reasonable grade separation program.

The first work to be undertaken was that of the Louisville and Nashville Railroad. Between a point in their east Louisville yards and Kentucky Street, a distance of approximately 7,000 feet, the railroad crosses five streets, and the grades at these were sep-



14th and Main streets (site of old railroad station) after completion of grade separation

arated. Two other projects followed rapidly; the separation of grades at Spring Street (future U. S. 42) on the L. & N. Railroad and at 18th Street (Dixie Highway Truck Route) and 22nd Street (Dixie Highway Passenger Route) on the Kentucky & Indiana Terminal Railroad. There is now nearing completion a large grade separation project on 7th Street (U. S. 31 Business Route) at the L. & N. Railroad and the K. & T. Railroad, so that, during the past five years, there have been grade separations at twenty principal street crossings in this city.

In general, all projects are financed by the municipality under an Enabling Act of the Kentucky Legislature whereby the entire cost of the work including acquisition of property and property damage is divided between the city and the railroad—35% city, 65% railroad. Where the U. S. Government, through the Kentucky State Highway Department, has presented the city with a grade separation project, the city and railroad have been put to no expense except that of purchase of property, property damage and permanent tracks and equipment.

The Pennsylvania Railroad grade separation project has been done under a contract with the Public Works Administration whereby, with certain restrictions of employment and wages, the city will receive a 30% grant on the entire cost of construction, field engineering, inspection and testing of materials, but no grant on the purchase of property, property damage or permanent railroad tracks and equipment. When the grant is received it will be deducted from the total cost of the project and the remaining cost will be paid by the city and railroad as above stated: 35% and 65%, respectively.

Since July, 1931, there had existed a contract with the Pennsylvania Railroad to elevate their tracks and build subways at the various principal streets. The railroad declined to carry out the contract, but the Kentucky Court of Appeals affirmed the decision of the lower court on its validity and the city entered into a new contract with the Pennsylvania Railroad on July 18, 1939, to elevate their tracks in 14th Street from the south end of their Ohio River bridge to the L. & N. passenger station at 10th and Broadway, a distance of about 7,590 feet. The location of the elevated structure is north and south along 14th Street, over Broadway; thence eastwardly to 11th Street, where the tracks come to grade. Subways have been built at Main, Market, Jefferson, Walnut, Madison, Chestnut, Magazine, Broadway, 13th and 12th Streets. All other intersecting streets and alleys have been closed and 14th Street was abandoned for public use and deeded to the railroad.

The United States Government had set October 1st,

1939, as the date to begin work, and as no detailed plans for the construction had been prepared we were forced to make typical plans and elevations of the structures, showing as much detail as time permitted. At all subways, enough information was given to enable the contractor to furnish an intelligent bid. The quantities composing the work were carefully estimated and bids were received on September 18th, 1939; the contract was awarded on September 20th, 1939, and work was started on September 29th, 1939. The Engineers' Estimate

was \$1,240,191. The work was awarded to the Henry Bickel Company of Louisville, Kentucky, the lowest bidder, for \$1,206,591.61 and work was started immediately, as the contract called for completion prior to January 1st, 1941, or a severe penalty for the contractor. The project was completed before the expiration date.

The Pennsylvania structure is primarily an earthen fill, between concrete abutments in places, with steel girders spanning the subways. Wherever it has been possible, enough land has been acquired by purchase to build unconfined earth fills the entire length of the track elevation. Concrete retaining walls, longitudinal with the tracks, have been built only where land could not be purchased to advantage or where wall building was cheaper than buying property.

As the project approached the Ohio river at the northerly end, some 750 creosoted yellow pine piles 30 ft. long were driven at the two abutments and walls at Main Street for the Pennsylvania and Illinois Central subways.

All steel structures spanning the roadways are typically the same. They are of through plate girder design for double track, capable of taking the Pennsylvania Railroad standard 1928 live load, which is equivalent to Cooper's E-72. A 60-foot clearance between the curb lines of the roadway has a span of 66' 6" and 7' 8½" depth of girders. The floor system consists of 24-inch 140-lb. I beams spaced 2' 0" centers. Laced through holes in the I beams, 4" from the top and bottom flanges, are ⅞" round rods on 12" centers. The entire deck is encased in class "A" (3,000-lb) concrete 2' 3½" thick. Along the inner webs of the plate girders the concrete is extended to the inside of the top flange. The entire surface of the concrete is waterproofed with four moppings of

(Continued on page 22)



Old Pennsylvania R.R. passenger station at 14th and Main streets

Solving a Difficult Water Supply Problem

By RAY LYNCH

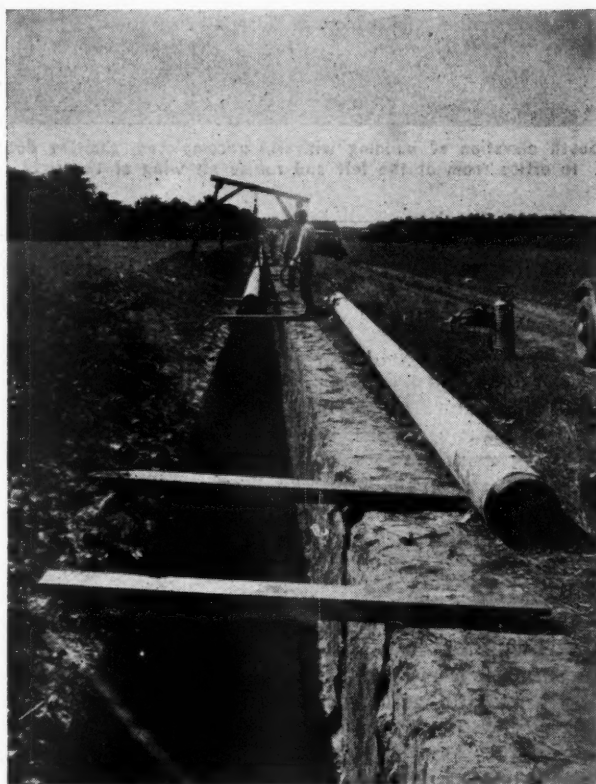
City Engineer, Pawhuska, Okla.

An impounding reservoir on a stream with drainage area inadequate to meet the city requirements is filled by pumping into it from another stream.

PAWHUSKA, Oklahoma, is located at the fork of two creeks, Clear creek and Bird creek, from which it obtains its water supply, a dam having been built across each about a half mile above the fork. Water flows over both dams for 60 to 90 days during the spring, but both creeks cease to flow during the late summer and early fall, and if the fall rains are late (or fail altogether, as in 1939) the water stored behind the dams is insufficient and a shortage results. Since 1916 this shortage has been overcome by cutting riffles, ditching, and pumping from water holes up stream, but even then the use of water has been restricted many times. During the late summer there is normally a deficiency in the water supply from these streams of 60 mg; also the salt content of the creek water is high then and the water is expensive to treat.

In 1936 the city, with the help of FERA and WPA, built a dam which impounded a lake (known as City Lake) which, when full, would cover 95 acres, have a maximum depth of 48 ft. and an average depth of 22 ft., and store 680 mg. The spillway of this dam is 64 ft. above the settling basin at the filter plant.

Unfortunately the drainage area above the dam is so small that the lake has never filled. The area is all pasture land, however, and the run-off is clean and safe for drinking, and the loss by evaporation is comparatively small because of the depth of the water, and it was decided that it would make an excellent raw water storage basin into which could be pumped the surplus water of Clear and Bird creeks during the spring high-water periods, when about 10 acre-feet a



Laying 10" steel main to pumping station



Backfilling with Fordson and mormon board

day flows over the dams not including stream freshets.

To carry out this idea, the City Commission in 1940 decided to lay a 10" line from City Lake to the Clear creek pump station, a distance of 13,267 ft., build a new pump house there, install a new pump and make improvements in the distribution system. WPA approved the project and agreed to furnish \$38,240, the city to spend \$24,700. This work was completed by the end of the year, except for some improvements in the distribution system.

The present plan of operation is to pump water from Clear creek into the City Lake during the spring, and use the lake water during August and September. It is estimated that the city will require 70 million gallons of water during those two months, while 100 million can be pumped into the lake. The pumps are operated electrically during off-peak periods and as the city owns its own electric plant the power cost for pumping is negligible. With the lake full, water can flow to the plant by gravity as required.

An automatic float valve at the plant controls the water level in the settling basin, and when water is being pumped from Clear creek to the plant, all that is

(Continued on page 44)



South elevation of building with fill uncompleted, showing door to office room at the left and refuse pit wing at the right

TWO major problems were involved in an incinerator project at Darien, Connecticut, one of location and the other of design. This article will confine itself to a discussion of these two special problems.

The town of Darien contains no industrial activity of any sort, and its commercial activities are extremely limited. In other words, it is a residential township and in the main includes large estates, with extremely exacting zoning regulations.

In the ordinary community, the fringes of the corporate limits are of more or less negligible value, and its outskirts include waste or farmland unsuited to residential or industrial development. In the case of Darien, the situation is reversed. On the south, the town is bordered by Long Island Sound, with valuable shoreline property. The remaining periphery of the corporation is studded with large estates, with unusually high land value, and, with the exception of two areas which have been developed as gravel pits, there are no low-priced sections and none is zoned to permit of municipal or industrial use except in the center of the town. This being the case, there were two valid reasons for a central location of an incinerator plant; first, zoning regulations, property values and objections by owners of large tracts of land; and second, a central delivery of refuse which would not cause unnecessary truckage to a non-symmetrical site. The location finally selected is within a few hundred feet of both the center of area and the center of population.

A collateral problem in locating the incinerator site was that of concealment. It was found possible to select a site with an area of about 12 acres, adjacent to the Boston Post Road, which contained two wooded knolls, behind which an incinerator could be located with complete concealment. The accompanying illustration shows a view looking toward the incinerator site, taken from the Boston Post Road. In this photograph the new roadway to the incinerator is visible for the first 400 feet and then turns northerly behind the first knoll so that truckage to the incinerator is also soon concealed. The incinerator building is located about 900 feet along a line perpendicular to the Boston Post Road, the approach road leading through undisturbed woodland, and the plant is located in the midst of existing trees and undergrowth, eliminating the necessity for artificial landscaping.

The population which will be served by this plant is approximately 10,000, and it is estimated that the present average daily demand upon the plant will be

about 12½ tons. Seasonal and daily peaks will approximate 24 tons. The initial installation was designed to provide two 30-ton, single cell units, and the layout of the building and equipment is such that the north wall of the incinerator building may be removed and the building extended to receive a third unit, consisting of a two-cell furnace with 60-ton capacity. The chimney and main breeching is of 120-ton capacity, and the refuse pit provides a capacity to retain three days of refuse for an ultimate population of about 15,000 people, thus providing for a serious electric power interruption such as occasionally takes place along the Connecticut coast. It was the desire of the town and of the authors that this plant should provide mechanical means of handling material and a minimum of manual labor. It was also desired to supply this plant with handling facilities sufficient for the larger plant without an unwarranted expense for this size of project. It was felt that these conditions were met by the installation of a refuse pit and a monorail system instead of a bridge crane, this monorail carrying a standard electric hoist and a single-line clamshell bucket. The refuse pit is on a line with the charging hoppers, and the ash storage pit is on the same monorail line, so that this bucket can be used not only to supply material to the furnaces, but to remove ashes from the ash pit.

Such a plan also permitted of a two-story plant. It obviated the disadvantages and manual labor involved in a floor dump; it removed the necessity of an



Approach road to incinerator—all that can be seen from the Boston Post road

Incinerator

By **HENRY W. TAYLOR**
Consulting-Engineer, and

WALTER A. BATES
Superintendent of Highways and Bridges of the
Town of Darien, Connecticut

Plant at Darien, Connecticut

Concealing a plant in the center of a community, and designing it for operation with a minimum of manual labor and provision for expansion.



East elevation showing truck doors at refuse pit and windows in charging room

ash tunnel or three-story plant; it afforded any amount of refuse storage that might be desired; it eliminated the cost of a bridge crane and that of a crane operator, and developed into a straight-line design which utilized the charging apparatus and bucket not only for the charging operation but also for ash removal. The motorized trolley, electric hoist and single-line bucket are operated by remote control from the charging room floor. A single-line bucket is equipped with only a hoisting line which, in this case, is reeved through the bucket and anchored on the trolley chassis at one end, the other end being attached to the hoisting drum. When the bucket is open and lowered onto the refuse in the refuse pit, the single hoisting line is slackened off, then taken up to close the bucket and to lift it. When it is desired to open the bucket, it is lowered to a point of rest until the tension is removed from the lifting cable, when a tumbler throws down by gravity. Upon lifting, the bucket opens, but instead of dumping its load as is the case with a 2-line bucket, it unfolds in contact with material below it.

The incinerator units extend perpendicular to the line of the monorail, and both the combustion chamber

and expansion chamber capacities are combined in a single chamber with vertical baffle extending east of the furnace cell itself. Preheat is secured by carborundum preheaters without by-pass. Ash hoppers are dumped by hydraulically operated segmental ash gates, which discharge into a hydrojet trough whose alignment is parallel to the monorail, and which discharges the ashes into a common ash storage pit north of the furnaces and directly under the monorail system.

The accompanying illustrations show the building practically completed, the chimney completely installed, and roadways and plazas partially constructed. They also show the natural woodland adjacent to the plant building itself.

The project is scheduled for completion in October. The General Contractor is Jander & Forgione, Inc., of Greenwich, Conn., who sublet the incinerator equipment to the Pittsburgh-Des Moines Steel Company. The project was designed by Henry W. Taylor and the supervision of its construction is in charge of the writers, the town being represented by J. Benjamin Corbin, 1st Selectman, and by an Incinerator Committee of nine, whose Chairman is J. C. Molinar.

Force Account vs. Contract in County

Which is preferred, and why, in about six hundred counties, as determined by answers to a questionnaire. How local conditions affect the decisions.

OF nearly one thousand counties answering a questionnaire sent out by the editor of PUBLIC WORKS, 595 gave definite replies to the following question: "In your opinion, which is more advantageous for your county, construction by contract or by force account." Of these 595 definite replies (many more gave indefinite replies), 368 or 62% find force account more advantageous, while 227 or 38% report that contract construction is better. Most of the reasons for these beliefs are based on local conditions and local experiences. Following an analysis of these reasons, will be given a number of quotations selected from the 595 replies because of their general interest.

Cost.—In comparing costs of highway work by force account and by contract, 123 engineers made rather definite statements, and of these 70, or 75% stated that it cost less to do the work by force account. Various reasons were advanced, some of which will be quoted in the comments following. In some States, practically every county follows the same system, either contract or force account, while in others both methods are used. For instance in Iowa, of 41 counties reporting, contract construction is almost universally favored; but in Kansas, the 50 counties replying are equally in favor of force account.

Efficiency and Quality of Work.—It was stated by 28 engineers that a better job was done, there was a greater return for the money and the work was more efficient by contract, while force account was favored for the same reasons by 19 engineers. If this matter of efficiency is combined with cost, on the supposition that many engineers feel that "more for the money" and "more efficient" are synonymous with less cost, the verdict favors force account 89 to 81.

Equipment.—Of 40 engineers mentioning equipment as a factor, 28 or 70%, stated that county equipment on hand was better suited to the work than was that owned by contractors. Generally contractor equipment was favored for heavy excavation and for high types of paving, which is constructed by relatively few counties.

Local Employment.—As might be expected, force account was overwhelmingly favored because it "employs local men" and "more money stays in the county." In all, 53 engineers gave this as their reason for feeling that force account construction was most advantageous; while none favored contract construction for the same reason.

Local and State Laws.—A few engineers—only 5 in



Galion Motor Grader on maintenance work

Road Work



Barber-Greene Gradation Control Unit in central plant setup for high type mixes

all—stated that local or State laws required construction by contract (4) or by force account (1).

Management and the Use of Skilled Labor.—That force account “permitted more skilled men to be used,” “allowed better supervision,” made it possible “to build up and maintain a force of trained men” or resulted in “better management,” presumably through trained and reliable foremen, was stated by 26 engineers; while 4 said that the contractors’ organizations had the better foremen and supervisors.

Graft and Petty Politics.—Nine engineers favored the contract method because it eliminated petty graft and politics, while one man felt that force account was preferable for the same reasons.

Flexibility and Convenience.—The score on this fac-

account construction numbered 235 and of contract construction 137. In addition, there were a great many who felt “there is a place for both.” In essence these men utilized contract construction for big excavation jobs and for large bridges, neither of which most counties are well equipped to do; while force account was employed on smaller jobs and on the usual work for which the county-owned equipment was adapted. Also a large number merely stated the methods used but gave no reasons why it was preferred.

Below are given typical statements by our readers regarding local conditions.

Our Readers Say:

J. Percy Oliver, Judge of Probate, Tallapoosa Co., Ala., favors force account because experience has shown it costs less to do work under the supervision of commissioners and road foremen. In Montgomery Co., Ala., Thos. H. Edwards, county engineer, contract construction is cheaper.

Six counties in Arkansas split even, three favoring contract and three force account. Typical statements pro and con are: “Contract permits better supervision and usually better construction and alinement,” C. P. Whitney, County Engineer and Surveyor, Sharp Co.; and “we find it more economical to employ our own men under our supervision,” Joe Hardin, Road Commissioner, Sebastian Co.

Of eleven California counties replying to this question, seven definitely favored force account, two contract, and two felt that each had its place. F. A. Steiger, Surveyor, Solano Co., says: “All labor costs remain at home, no labor unions, small cost for plans and specifications, no advertising, very little cost for inspection, changes from original plans are at actual cost, and there are no law suits.” Stanislaus Co., Geo. D. Macomber, Surveyor, says: “No time is lost waiting to advertise bids and we are able to do the work for the same amount of money and often for less.” Hugh Stone, Surveyor, Yuba Co., says force account is more pliable. Both C. V. Patterson, Ass’t Engr., San Francisco and A. J. Watson, County Surveyor, Plumas, say contract construction is more efficient. C. C. Stitt, Surveyor, Yolo Co., says “we can construct more miles at less cost and hire all local



Model 300 General Excavator on highway project near Camp Meade, Md.

tor was 28 for force account to 7 for contract. Among the items cited were “greater flexibility,” “saving of time,” “quicker,” “more convenient” and permitted “small jobs to be done without delay.” These are admittedly advantages of the force account method of construction.

Control and Planning.—In the ability to “know costs in advance,” “control money better” and “plan in advance,” contract won out over force account 20 to 9. There is less chance to overrun with contract construction. If the bid prices exceed the estimate, modifications and changes can be made in advance in order to keep within the funds allotted.

Summary.—On these items, the advocates of force



Jaeger bituminous paver.

labor." Edgar C. Smith, Surveyor, Fresno Co., uses force account on smaller jobs and contract on the larger ones where his foremen lack experience. San Mateo Co., E. R. Hoffman, Sup't, does excavation by contract but base rock and oil surface by force account, finding this procedure generally most satisfactory and economical.

H. C. Davis, Engineer, Broward Co., Fla., favors force account for betterments and new construction involving short extensions, but believes contract construction is better for large projects. In general, the eight Florida and Georgia counties reporting are evenly split.

T. W. Cully, Engineer, Caribou Co., Idaho, favors force account because it results in better construction. Three of four reporting Idaho counties favor force account.

From Illinois, there were 29 reports; seven use both, ten use contract and twelve force account. B. C. McCurdy, Sup't of Highways, St. Clair Co., says "choice depends entirely on nature of work;" William Yowell, Sup't for Macoupin Co., favors contract, partly because supervisors are hard to get. Clark Co., Van Tarble, Sup't, lacks sufficient county equipment and therefore favors contract construction. A. L. Heitman, Sup't, Logan Co., prefers force account because "we are able to provide steady employment for a select personnel." S. C. Campbell, Sup't, Carroll Co., says contract is cheaper and faster; the county has both hills and flat lands and different types of equipment are needed for efficient construction, all of which the county cannot afford. Menard Co., J. Colby Beckman, Sup't, "can do work cheaper than by contract and use Menard County labor." J. V. Waddell, Sup't, Fayette Co., does heavy bridge construction by contract, but all other work by his own gangs, making sufficient profit for the county to acquire new equipment.

In Indiana, the 19 reports received showed 6 counties preferred contract construction and 11 preferred force account, the other 2 using both. Contract construction is "cheaper" according to Paul W. Phipps, Surveyor, Madison Co., and "more economical" according to Homer M. Gardner, Surveyor, Scott Co. But Austin L. Myers, Surveyor, Daviess Co., says force account is less expensive and involves less red tape; and J. C. Eckert, Hwy. Supervisor, Ripley Co., says "we are getting better roads for less money than were formerly obtained by contract." W. T. Corwin, Engineer, Jay Co., puts one phase of the case for con-

tract construction by saying "you can make the contractor do the work right." Lowell B. Griffin, Surveyor and Highway Supervisor, Johnson Co., is equally effective in stating the case of the less affluent counties when he says "our limited income can be better spent with our own equipment and labor where it produces more construction than would contract."

Iowa counties, according to the 42 that replied, favor contract construction 31 to 4, the other 7 feeling there is a place for both methods. Typical comments are as follows: J. A. Rowat, Engineer, Monroe Co., "force account—we have good equipment and competent supervision"; H. M. Smith, Engineer, Kossuth Co., "contract offers more efficient methods of construction and more roads are constructed for less money"; J. F. Maher,

Engineer, Carroll Co., "contract is better and we can budget road funds accordingly"; F. G. Rubey, Engineer, Page Co., "we know where we are financially and get the job done quicker by contract"; "more roads per dollar by contract," T. E. Martin, Engineer, Ringgold Co., and similar statements by many others. Contract construction is definitely preferred in Iowa. But Floyd K. Brown, Engineer, Keokuk Co., says "there is a place for both; some roads do not require extensive surveying and planning as required by contract work." C. P. Goplerud, Engineer, Mitchell Co., states "force account is better for light traffic roads and contract construction for main, heavy-traffic roads."

A large percentage of Kansas counties replied—49 in all. Of these 41 favored force account, 4 favored contract construction and 4 felt there was a place for both. It is interesting to compare the vote here with that of Iowa and to note the complete reversal of trend. A single statement is repeated over and over again—"we own our equipment, we have skilled men, we can build roads better and cheaper than by contract." In essence, this statement was made—not always in these words, however, by the following county engineers: G. W. Houser, Dickinson Co.; C. H. Depenbrock, Wabaunsee Co.; M. M. Mayse, Clark Co.;

(Continued on page 42)



Breaking up a road with a Cleveland roter

Developing the Beatrice, Nebraska Water Supply

Privately owned supply to become property of the city under a 20-year amortization plan

By JAMES A. TERHUNE

Superintendent, Dept. of Public Works, Beatrice



James A. Terhune

BEATRICE, situated on the Big Blue river in the southeastern part of Nebraska, has a population of approximately 11,000. In 1886 it installed a water supply system taking its supply untreated from the Blue river. Filters were installed in 1890, but were soon discontinued because of operating difficulties. In 1911-12 this source of supply was abandoned and water secured from wells about 1½ miles from the city, being brought to the pumping station in a 14" cast-iron main.

As the demands increased, these wells became inadequate and in 1931 the city contracted with the Layne-Western Co. to develop a group of four wells about seven miles from the city, and with the Beatrice Water Corporation for the purchase of water from this source at a fixed rate for a period of years, after which the system would become the property of the city. The water is brought to the city through an extension of the 14" main built for the original wells. This main was laid, with leadite joints, in a 5-foot trench dug with a trenching machine.

In 1936-37 it again became evident that the increased demands made the supply inadequate, based on the fire flow recommended by the National Board of Fire Underwriters for a city the size of Beatrice, or 3,200 gpm for ten hours, which, combined with the consumption on a minimum day, gives a flow of 5,200 gpm, or a rate of 7.4 mgd. An engineering survey was recommended by a committee appointed by the Chamber of Commerce, and the City Council engaged Black & Veatch to make such survey.

On Sept. 6, 1938, this firm reported that it found the distribution system inadequate for the maximum demands, including fire protection, of a city of the size and characteristics of Beatrice; also that the supply was adequate for the present if additional reservoir capacity be provided, although it would be advisable for the city to investigate where an additional supply could be obtained in the near future. It recommended that the construction of a three-million-gallon reservoir, an auxiliary pumping station and main extensions be undertaken immediately, at an estimated



Pump house and pump No. 1. This pump has a 1,200 gallon per minute capacity



Pouring a Leadite joint on the 14 inch cast iron pipe line

cost of \$136,000. Plans and specifications for these improvements were prepared and an application made to the PWA, which was approved, and work was started early in the Spring of 1939.

A quarter of a block of ground about half a mile from the old pumping station was purchased and on it was constructed a three-million-gallon concrete storage reservoir 168 ft. square and 15 ft. deep. This is roofed over and entirely covered with about 4½ ft. of earth. A new pump house was built on the same property, and in it were installed four pumps, of 900 gpm, 1,500 gpm, 2,500 gpm and 2,250 gpm capacity, respectively. The first three are operated by electric motors of 60, 100 and 150 horse power; and the fourth, provided solely for stand-by purposes, by a 150 hp gasoline engine.

To reinforce the distribution system there were laid 2,180 ft. of 16", 2,970 ft. of 10" and 3,349 ft. of 8" cast-iron pipe. In connection with these extensions, six additional fire hydrants were installed.

Water from the four wells built by the Layne-Western Co., seven miles northwest of the city, is pumped by four Layne turbine pumps: one 4-stage direct connected to a 60 hp motor, capacity 1,000 to 1,200 gpm; two 6-stage with 40 hp motors, capacity 725 to 850 gpm; and one 3-stage with a 300 hp motor, capacity 500 to 600 gpm. All motors are 440-volt squirrel cage. One of the 6-stage pumps is designed to operate in conjunction with the 4-stage, and when so operating has a capacity of approximately 500 gpm. These deliver the water to the reservoir, from which it is pumped directly into the mains untreated.

The Beatrice Water Corporation maintains and mans the wells, which are connected by telephone with the pumping station. This company owns the wells and seven miles of pipe; the city owns the distribution system, and will come into possession of the wells and pipe line in 1951 under the contract, by which the city agrees to take at least 365,000,000 gallons of water a year, the water being metered before it enters the reservoirs; the rate paid being based on a 20-year amortization plan.

The water is of good quality for both domestic and industrial purposes. Bacteriological tests are made periodically by the State Board of Health in Lincoln.

Railroad Grade Separation at Louisville, Ky.

(Continued from page 14)

hot asphalt and three layers of cotton fabric over which is laid asphalt plank 1¼" thick as a protective cover. The waterproofing follows the standard specification of the American Railway Engineering Association. The steel work was shop inspected and given one coat of red lead before shipping. The field inspection was done by the Engineering Department of the city. When the erection had been completed three coats of white lead were applied to all exposed steel, the standard practice of the Pennsylvania Railroad. The color of the paint matched that of the concrete. The abutments and wing walls are gravity type with heavily reinforced concrete bases and walls.

Retaining walls, longitudinal with the tracks to support the fill, are cantilever type, varying in height from a few feet to 26 feet. All concrete exposed to the fill, both above and below grade, is waterproofed with a coating of hot asphalt. The concrete composing the foundations and bases of the abutment and retaining walls is class "B" (2,500-lb.), and class "A"

(3,000-lb.) was used for the walls and abutments above the foundations.

A fair idea of the magnitude of the work may be gained from the following quantities, which were the principal items in the contract: Excavation and fill, 175,000 cu. yds.; Class "A" concrete, 14,900 cu. yds.; Class "B" concrete, 10,100 cu. yds.; Steel, 1,970 tons; Waterproofing, 11,000 sq. yds.; Sheet asphalt paving, 48,000 sq. yds.; Temporary tracks, \$172,000.

The cost of permanent tracks, operating signals, new freight sheds and yards, purchase of property and property damage brought the total project cost to \$2,111,000.

The work has been done under the direction of I. W. Geer, Chief Engineer of the Pennsylvania Railroad Company and J. B. Wilson, Chief Engineer of the City of Louisville.

Sewage Pumping Station Protects Bathing Beach

(Continued from page 12)

to a transmitter which electrically transfers the rate to a recording instrument located on a panel of the switchboard.

Water-hammer pressure waves are dampened by a 48-in. diameter, 8-ft. long surge tank, given an initial charge of compressed air. The discharge line from each pump is fitted with lever-weighted check valves, which close rapidly when the pump motor circuit is opened. The surge tank is connected to the end of the force main (pump header) in a vertical position, without any obstructions. In operation, the air pressure in the surge tank forces a volume of sewage into the header when the pumping head is removed, thereby dampening the water-hammer waves, both abnormal and sub-normal. A diaphragm pressure box is connected to the pump header (which is the lower end of the force main) and pressure is transmitted to a recording pressure gauge on the switchboard. This method of water-hammer control is very effective for sewage pumping force mains that have high total dynamic heads.

Sewage is lifted approximately 95 feet in a 1700-ft. force main to a manhole, where connection is made to a 35-ft. long vertical drop pipe which connects to the Richmond Sunset tunnel. This drop pipe acts as a siphon, reducing the total dynamic pumping head, thereby increasing the station pumping capacity.

The pumping equipment consists of two 4-in. centrifugal sewage pumps, each with a discharge capacity of 800 gpm against a total dynamic head of 103 ft., and two 5-in. centrifugal sewage pumps connected in series, discharging 1400 gpm against a total dynamic head of 140 ft. The 4-in. pumps normally handle the sewage flow either single or in parallel.

The 5-in. pumping units are placed in service during the recreational season to prevent the runoff from light summer showers overflowing a leaping weir and reaching the beach.

The station is fully equipped with all necessary tools, tool cabinet, work bench; storage bins; oil rack with oils, greases, and wiping rags; ladders; hose on portable reels; fire extinguishers, both carbon dioxide and carbon tetrachloride; wall-type first aid kits; rubber boots, gloves, apron; rakes, shovels and janitorial supplies consisting of brushes, mops, buckets, disinfectants, soaps, etc.

The cost of the project was \$97,000 including \$13,000 for the land.

Subsurface Sewage Disposal

UNDERGROUND disposal by means of seepage is usually the best and often the only means of getting rid of sewage from homes, camps, hotels and other places not large enough to justify a sewage treatment plant. Remarkably satisfactory results are obtained if the disposal system is properly planned and constructed. Under average conditions, a service life of 15 or 20 years can be expected, with no more trouble than may be expected from a sewer connection. To accomplish such results, the following essentials must be observed.

1. An adequate and well-designed tank. Data on tank capacities for various types of installations have been published in PUBLIC WORKS. (See April, 1940, issue, page 60.)

2. A properly designed and built disposal field, using good materials. Poor tile, improper laying and unsuitable porous material cause early failure.

An open and sandy soil is always desirable, but most places cannot choose soil types. Fortunately, a properly designed system will work in almost any soil; but the more dense the soil, the greater the area and care and attention to detail that is necessary in order to insure long and satisfactory service.

The basis of design is the amount of liquid that will be absorbed by one square foot of soil. A test is made by digging a hole 1 ft. square to the depth at which the tile line is to be placed, wetting this soil, and then

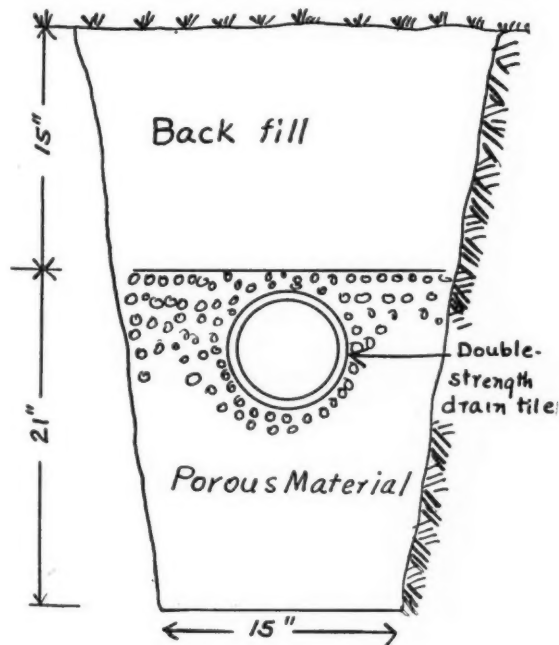


Fig. 2—Porous material under pipe provides reservoir, permitting temporary overloading

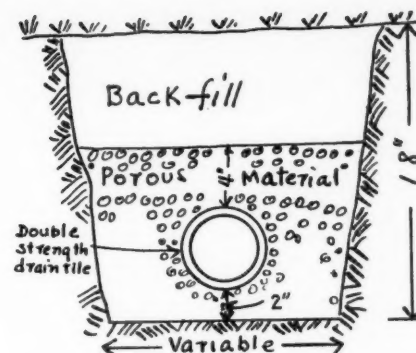


Fig. 1—Usual construction

filling the hole. Note the time required for the level of the water in the hole to drop, and compute the area of trench bottom required as follows:

Time required for water to fall 1 inch, minutes	Allowable rate of application, gallons per sq. ft. of soil per day
1	4.0
2	3.2
5	2.4
10	1.7
30	0.8
60	0.6

A trench width of 18 to 30 inches is usual, and the section Fig. 1 herewith shows the method of construction. An alternate method of construction is shown in Fig. 2. This latter method has the advantage that it permits temporary overloading because the porous material under the pipe provides a reservoir area.

Essentials in Design

Pipe Material.—A good grade of open joint tile should be used. A.S.T.M. C4-24 Extra Quality Drain Tile have high specifications and as the cost of the tile is the small part of the total cost, the very best quality drain tile is a good investment. Our recommendation is the Extra Quality Drain Tile mentioned above.

Porous Material.—The porous material used to fill around the pipe should not be too large. Material no larger than $\frac{3}{4}$ -inch pieces is recommended. This should be clean and of good quality. Quantity should not be skimped.

Pipe Grades.—The pipe line should be laid accurately and on a very flat slope—2 to 3 inches per 100 feet is recommended. A steeper slope results in overloading the lower end of the line. The pipe should be laid to a true and uniform grade, using a timber support if necessary.

Siphon.—On daily flows in excess of 1000 gallons per day, a siphon is desirable, so that the entire line is dosed evenly. The siphon chamber capacity should not exceed 70% of the capacity of the pipe in the distribution system. When a siphon is used, consideration should be given to providing two tile distribution systems and dosing these alternately.

Other Details.—Individual runs of pipe should not exceed 150 feet in length, and parallel runs should be at least 6 ft. apart. Cover should be sufficient to prevent breakage of the tile from any usual cause. A not unusual cause of trouble is breakage of the distribution pipe by passage of a truck over the line. This often occurs during construction but may not be discovered for two or three years, when the system gives trouble. A strong pipe is the best protection against such accidents. Lines should generally reach below frost, but may work well even if they do not. Septic tanks rarely, if ever, freeze.

Streamlining County Highways Lowers Maintenance Costs

By J. S. WAGNILD

County Engineer, Cottonwood County, Minn.

Higher type of construction in a Minnesota county reduces snow handling, frost heaves, erosion and other maintenance costs.

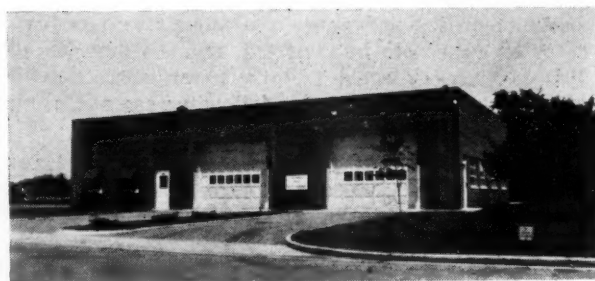
WITH a total of 365 miles of highways, most of them obsolete, to keep open for traffic throughout the winter months, Cottonwood County, Minnesota, found that the use of snow fence and snow removal equipment became increasingly expensive, and it was imperative that the cost of snow-control be lessened by new design and by reconstruction of a large portion of our present highway system.

In 1936 we built our first mile of streamlined highway, and have continued this program on all new construction and reconstruction jobs. Our specifications call for fills with 3 to 1 slopes; $3\frac{1}{2}$ -ft. flat-bottom ditch $9\frac{1}{2}$ feet wide, and variable backslope. In heavy cuts we acquire extra right of way so that backslopes are not steeper than 4 to 1. Although farm land is worth from \$50 to \$100 an acre, we generally do not purchase any right of way, but the land owner signs a construction permit which gives us permission to enter upon his land for the purpose of clearing and backsloping when the road is under construction. We agree to move his fences, replace the top soil and seed down ditches and backslopes. This type of construction cleans up the right of way, removes the ugly scars of past construction practices, and tends to make the road blend with the surrounding landscape. We have built over 100 miles of this type of road and so far have had practically 100 per cent cooperation with the adjoining property owners.

All new grades are built to Minnesota Highway Department standards for secondary roads. Wherever possible, these snow-resistant highways are built above adjacent land, giving the wind an opportunity to sweep them free from snow. With 100-ft. rights of way and wide ditches, excavation for new roads, as compared with older types, has been more than doubled. Excavation on this new type of road runs from 15,000 to 30,000 cu. yds. per mile, as compared with 6,000 to 8,000 cu. yds. per mile, depending on the topography, on the older type roads.

The direct result of this type of construction has been a reduction of 50% or more on our snow removal costs, to say nothing of the greater convenience to road users. These highways remain open to travel even during the most severe storms and thus become a very valuable asset to the traveling public.

Minnesota climate, with its extremes, is destructive to all types of road surfaces. The extreme temperature changes, coupled with moisture and soil conditions, cause extensive heaving, making certain highways



Central shop and office, Windom, Minn.

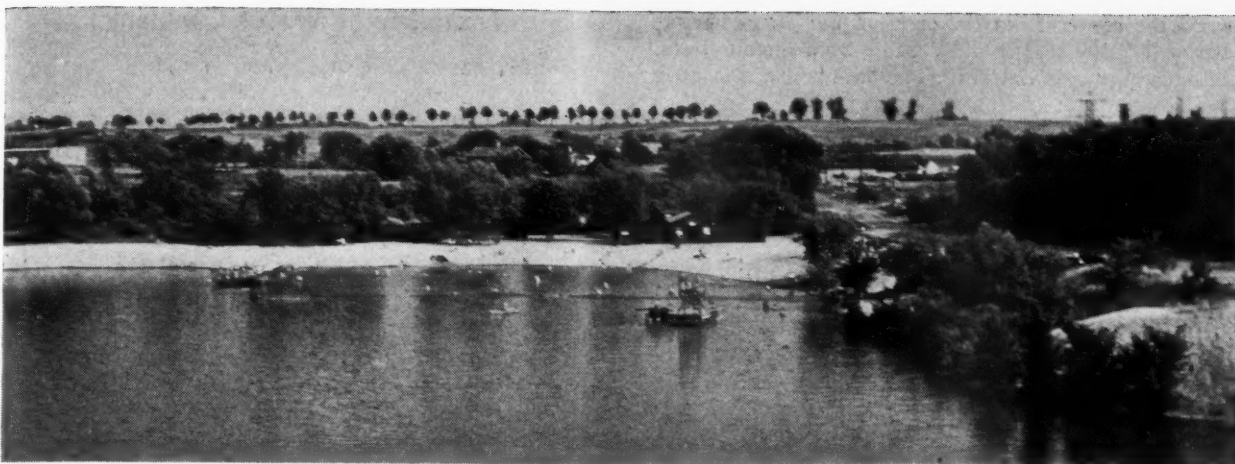
dangerous to travel; and with the spring break-up some become impassable and require major repairs. Restricted travel and load limits cause much inconvenience to the road user and also bring about a loss in revenue to both state and county highway departments each year. All of our new construction is carefully studied to eliminate frost heaves which may develop into boils or impassable mud-holes in the spring break-up. Soil studies and careful marking of frost heaves prior to construction have proved valuable; in fact, this pre-construction study has helped us to eliminate this costly spring break-up.

Another benefit of this type of construction is the elimination of much snow fencing; in fact, we find it necessary to fence only where groves of trees and buildings are near the roadway. As a typical example, on a 10-mile stretch of road, we formerly put up every year approximately 11,000 feet of snow fence, while after rebuilding, this same ten miles is taken care of adequately with 2,000 feet of snow fence.

Sodding and seeding of ditches and backslopes have done much to change this part of the right of way from an unsightly weed patch to a neat, well-kept roadside. The farmer is willing to mow the roadside if it can be mowed with ordinary farm equipment; he can make use of the hay and we seldom find it necessary to cut these roadsides at county expense. In the past our annual weed control bill has run approximately \$13 per mile, and with 100 miles of it practically eliminated, we are now saving at least \$1,300 annually on this one item alone. Also there is considerable saving due to well-sodded slopes and ditches, which help to eliminate excessive erosion and washouts.

Of the 365 miles of highways in the county system, approximately 100 miles have a traffic volume of from

(Continued on page 47)



View of the beach at present

Converting an Abandoned Sand Pit into a Municipal Swimming Beach

By PRESCOTT LUSTIG

A nine-acre pond used dangerously as a "swimming hole" was filled in and converted into a safe and popular swimming pool and beach.

AN ABANDONED sandpit that was an eyesore to the public and an "attractive hazard" to young swimmers of Janesville, Wisconsin, is being converted into a swimming beach and park at about one-third the estimated cost of a pool with similar facilities. Working between the freezing and swimming seasons since the fall of 1938, the project, which was planned by city engineer Joseph Lustig and is being built under his supervision, is now about half finished and will be completed, except for the construction of a proposed masonry bath house, in 1942; giving a sandy beach area that will accommodate 4,000 persons, dressing facilities, and piers with several diving boards.

The sandpit, from which all the available sand had been taken years ago, occupied about 27 acres in which was a pond of about 9 acres which was used for swimming but was dangerous because its banks were



Pier and beach in use

precipitous and the depth reached 20 to 30 ft. in the center. Swimming in Rock River also had been made objectionable by algae, and the local Lions Club bought the property (aided by \$1,763 furnished by the city) and donated it to be developed into a swimming beach.

This development consisted principally in grading down the 15 ft. banks around the edge of the pond and filling in part of the latter to provide a safe beach and wading area, and constructing a bath house. At first a swinging crane was used to move the sand from the banks into the pond, and when this had done all its reach permitted the city used for the purpose a 6" sand pump mounted on a barge which it purchased cheaply second hand. This was used on two 7-hour shifts during the short working season, the labor being furnished by WPA. When the grading has been completed there will be about 600 feet of sandy beach.

The beach will be U-shaped, with piers projecting



Close-up of the bath house

toward the center from the ends of the U. A diving tower will be located in deep water between the piers, accessible only by swimming. The bath house is located at the center of the U. A temporary bath house has been built which has proved so satisfactory as to attract the attention of neighboring cities intending to build bath houses. It consists of a central building 18 x 25 feet, covered with a green composition roof, with dressing rooms in two wings built in open-topped stockade form so that they are open to sun and air. The walls of these wings are 9 ft. high, of 2 x 12 planking cut to a point at the top and joined with vertical splines to make the walls peep-proof when the wood shrinks. The dressing rooms are 21 x 25 ft., the women's wing having 15 individual booths and men's wing 8. Partitioned shelves, open in front, are provided for the clothing of those who do not wish to pay 5 cents for checking in the central building, where baskets are provided for this purpose.

The water in the pool is that flowing underground to the Rock river a half-mile away, the water table here being about 2 ft. above the river level. The movement toward the river suffices to keep the water in a very satisfactory condition. Bi-weekly tests made by the State of samples from the center of the wading area and the ends of the piers have all proven satisfactory; in fact, a sample recently sent for analysis, just as taken from the pool, at a time when the average weekly attendance was 2,800 persons, was returned with instructions that samples should not be filtered before being sent.

The cost of the completed project will be about \$25,000. Filling has cost \$3,480 and bath house and piers \$1,462. In addition to building a permanent masonry bath house it is proposed to landscape the spot with extensive planting of shrubbery and flowers, and ample parking space will be provided near the bath house.

The city formerly had a masonry bath house on Rock river, but its use was discontinued when the river water became objectionable for swimming, and it has been turned over to the local Sportsmans Club and Boat Club, proving an excellent solution to their housing problems.

Taxability of Water Company

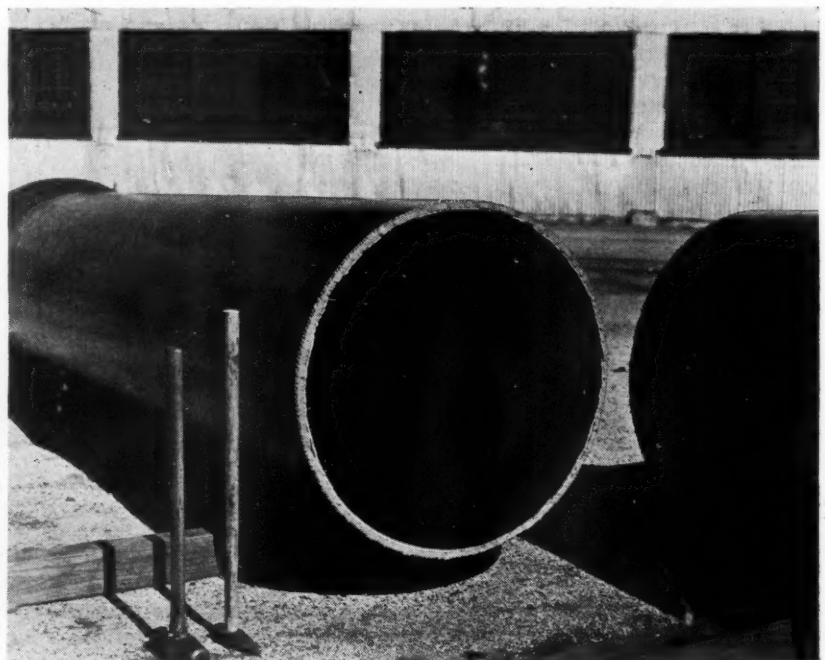
Holding a water company, by virtue of the provisions of its charter, to be a public utility and subject to taxation by the State Railroad and Public Utilities Commission under the Tennessee Code, section 1508, and to be regulated under section 5448, the Tennessee Supreme Court (Nashville Water Co., Inc., v. Dunlap, 138 S. W. 2d 424) said that "it is everywhere agreed that the right to lay pipes in public highways is itself a franchise, and that the right of eminent domain cannot be conferred except for taking private property for a public use, and for these two reasons among others, water and water works companies have always been held to be public utilities. The charter conferring such powers and imposing such duties is itself a public profession, and when it is accepted it becomes of binding force, and must be taken with all its conditions and burdens, as well as its privileges. It cannot be accepted in part, but must be taken as a whole. . . . As the company is endowed by the charter with all the rights and privileges of a public utility, the fact that it has not wholly exercised these powers and privileges cannot legally change its character. . . . Its acceptance of the charter is a voluntary act, and so long as it operates under it, it cannot claim that its properties are not affected by a public use."

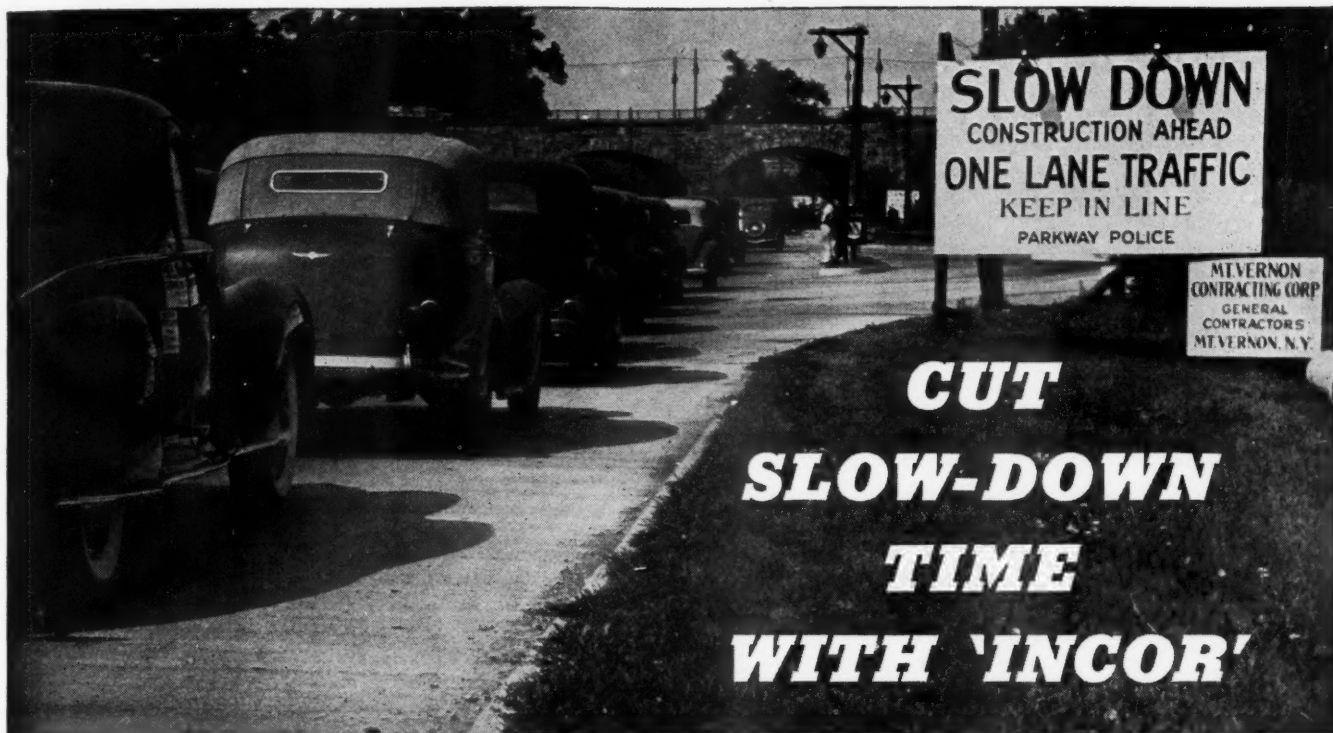
Cutting Cast-Iron Pipe With a Punch

It is frequently necessary to cut cast-iron-pipe in the field, which is usually done either with a portable mechanical cutter or with a hammer and chisel or flat-face cleaver. In using the hammer method for cutting cement lined pipe, reasonable care must be exercised to prevent shattering the lining. Obviously, the greatest cutting effect with the least shatter is obtained with punch point penetration. Using a punch and hammer, pipe, even with unusually thick cement lining, may be cut to give an even break of the lining with the pipe.

The illustrations show how a 20" Mono-Cast pipe with a 1" cement lining was cut with a punch. The punch holes were made $\frac{1}{4}$ " to $\frac{3}{8}$ " apart, a 3-pound punch being struck with a 6-pound hammer, three times around the pipe.

Below—Cutting a 20" cement lined pipe with a punch. Right—Cut completed





'INCOR' SPEEDS NEW YORK PARKWAY WIDENING



ONE after another, highway bottlenecks are being eliminated. Traffic congestion at one of the busiest spots in Westchester County's parkway system was relieved by widening Saw Mill River Parkway from 4 lanes to 6, with center dividing strip, a distance of 2 miles from terminus of Henry Hudson Parkway to Cross County Parkway.

Good job planning included the use of 18,000 bbl. of Lone Star Cement in the major part of the work, with 1,000 bbl. of 'Incor' for closing out paving, access lanes, gas-station approaches, and gaps left open for drainage work. 'Incor' concrete placed one day, ready for use the next—"Slow Down" signs came down days sooner!

Use 'Incor'* to speed national defense—eliminate bottlenecks in highway, bridge and plant construction. Write for copy of "Cutting Concrete Costs." Lone Star Cement Corporation, Room 2204, 342 Madison Avenue, New York.

*Reg. U. S. Pat. Off.

Saw Mill River Parkway widening. Under Triborough Bridge Authority... General Contractor: Mt. Vernon Contracting Corp., Mt. Vernon, N. Y. ... Consulting Engineer: Gilmore D. Clarke, New York City.

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When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65



Curing a pavement in Rome, N. Y., with cotton quilts

Cotton Quilts for Concrete Curing Solve Jute Shortage Problem

Tests made by several States since 1935 show saving in cost and time over earth curing. Shortage of burlap makes substitution of cotton especially desirable.

TURNING an 88% loss in American cotton exports into a better method of curing concrete might be regarded as a striking conversion of a liability into asset. But when it cures not only concrete but a war-born shortage of jute burlap to do the same job, the achievement ranks still higher.

With over 12,000,000 bales of surplus cotton piling up in the nation's warehouses, due to loss of its export market, at the beginning of 1941, the intensified efforts of the Public Roads Administration, the Surplus Marketing Administration of the United States Department of Agriculture, and the Portland Cement Association have culminated just in time, it seems, to meet the new shortage of burlap mats for concrete curing by substituting cotton quilts for that purpose.

Legislation passed by Congress in 1935 first made it possible for the States as well as the Federal government to begin trial use of these cotton quilts. The government, through the Bureau of Public Roads, first made 90,000 of these quilts available to 23 State highway departments. Thirty-one States subsequently included them in their highway specifications as alternates on an equality with the jute mats.

According to the Public Roads Administration ("Public Roads" for January, 1940), "All of the State reports submitted in connection with this study confirm the preliminary laboratory tests by showing a high efficiency for cotton mat curing when judged by the following:

"1. Ability to maintain a film of moisture over the

surface of the concrete during the curing period.

"2. Strength of cores from mat-cured slabs as compared to those cured by other standard methods.

"3. Insulation of slab against temperature change."

"Although somewhat difficult to wet the first time, due to natural oils in the cotton filler, the mats will absorb from two to three times as much water as double 12-ounce burlap." Comments from over half the States showed that mats retain this absorbed water equally as well as earth and better than burlap. While other comment was that the time-period for the cotton quilt curing was so much less than the moist earth method that a cost-superiority was shown for the cotton in that respect.

Core tests as far as available showed that strengths from mat-cured slabs averaged approximately the same as those cured by other standard methods.

Excellent insulating qualities of the cotton appeared in temperature measurements taken on two California jobs during cold weather, where the minimum temperature under quilts was 40 per cent higher than the average minimum air temperatures, some of which were within the freezing range.

Under date of July 3, 1941, all District Engineers and Division Engineers of the War Department were directed to substitute the purchase of cotton cloth and cotton bags for the purchase of jute burlap and jute burlap bags wherever practicable.

INTERNATIONAL POWER

Keeps the Highways Open



Above: Cleaning up deep drifts with the efficient TD-14, equipped with bullgrader. This equipment is owned by the city of Pittsfield, Mass.



Above: Once over with this combination and it's all over. The International Truck, equipped with front-end rotary plow, is shown clearing an airport of snow.

NATIONAL DEFENSE will make new demands on the nation's streets, highways, and airports this winter. Materials, men and supplies *must* get through. It's going to be a real job to battle blizzards, clean up snow drifts, and keep roads and runways open.

Tackle that job with snow removal equipment powered by International Tractors and Trucks! These tractors and trucks will give you **POWER** and **STAMINA** for any emergency. They're ready for action at the first sign of a storm . . . and able to stay on the job without let-up until the roads and streets are open to traffic.

Lose no time in planning your snow-removal program. Build it around the new K-line International Trucks; International TracTracTors (Diesel and gaso-

line); and the five new International Industrial Wheel Tractors (Diesel and gasoline). See the nearest International Industrial Power dealer or Company-owned branch for complete information.

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KEEP 'EM WORKING!



Be prepared for whatever road and weather conditions are ahead. Put your International Trucks and Tractors in A-1 condition, ready for the toughest kind of snow fighting. Expert servicemen are ready to serve you at all Company branches and International dealers . . . to keep your equipment on the job. *Keep 'em working!*

INTERNATIONAL Industrial Power

cloth was frozen stiff, the under surface was still soft and moist.

Two Northern states also found them very effective in preventing freezing of concrete and subgrade.

In use, the saturated quilts or mats are placed on the green concrete in the same manner as the jute burlap mats. After that they are kept wet for 72 hours, though some States extend this to 96 hours on the cautious theory that concrete is costly and cotton isn't. One wetting a day is usually found sufficient. In placing the quilts, care is taken to fold any overlap back even with the edge of the pavement banking this edge with earth. This is to prevent rotting of the cloth.

Quoting further from the Public Roads Administration report: "The cost of curing concrete pavement as revealed by reports from 19 States, excluding the material cost but including supervision, labor, and transportation, averaged 2.15 cents per square yard. These costs were, of course, greatly influenced by local factors, chiefly hourly wage rates and weather conditions. For instance, the minimum State average of 1.08 cents occurred where labor was quoted as low as 20 cents per hour, while the maximum State average of 3.11 cents corresponded to an hourly wage rate of 68 cents per hour. For individual projects the range was from slightly over 1/2 cent to 6 cents per square yard. On one project, heavy rains made sprinkling unnecessary about one-fourth of the time. This helped to reduce curing costs 40 percent below the average for this State.

"The average total curing cost, obtained by adding the average material and usage costs, is 3.15 cents per square yard (1 cent material cost plus 2.15 cents usage

cost). However, as certain States omitted such items as cost of water for sprinkling, transportation of mats to and from the project, and the winter storage, it would seem safer to state that the average total cost should not exceed 3.5 cents per square yard. In nine States the cost of curing with cotton mats was compared with the cost of curing with other acceptable materials. A summary of these direct comparisons indicates that the cost of cotton mat curing is in general about the same as other commonly accepted methods used under similar conditions.

"Comments by the States reporting, based on experience, indicate that the life of cotton mats can be prolonged by proper attention to certain details, neglect of which hastens deterioration. A few such precautions are listed below.

"If cotton mats are rolled or folded and left damp, even for a few days, mildew sets in, destroying the covering fabric. They must be dried at the end of a job and prior to storage. Under favorable conditions, mats may be left on the slab and turned until dry; but unfavorable weather, particularly in Northern States, may require artificial drying indoors.

"Mats should be so stored that they can be periodically inspected for mildew.

"When saturated, full-length mats weigh approximately 100 pounds. If the center is allowed to drag on the slab, particularly in removing, this portion of the fabric soon wears out. Full-length mats may easily be handled by two men from a movable bridge. One State has developed a special type of bridge with a sloping apron from which mats can be accurately placed on very soft concrete without marking.

"The original intent was for mats to be placed

SPEED

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THE HOTELS THAT CHECK WITH EVERY TRAVEL STANDARD

crosswise on the pavement with their ends overhanging the edges of the slab, but constant contact with wet earth was found to cause deterioration. It was found preferable to bank the edges of the slab with earth and to fold the mat ends back even with these edges.

"In conclusion, the data from 19 States indicate that the cost of curing concrete pavements with cotton mats should not exceed that of other accepted methods. The survey also corroborates the laboratory findings that such mats not only retain moisture in the concrete but also have the valuable property of controlling temperatures in the slab, thus providing a type of protection not afforded by the usual surface-sealing materials."

The cotton quilts consist of sturdy cotton Osnaburg sheets, "Osnaburg" being a trade name for a rather coarse-woven fabric made from the poorer and less-costly grades of cotton. Between the sheets is stitched cotton batting, quilted lengthwise. The full-length quilts are 22½ feet long by 5¾ feet wide. Shrinkage in the fabric is allowed for in these dimensions. They are laid directly on the concrete or, in the case of walls, curbs, etc., are fastened over the exposed surfaces and thoroughly soaked with water.

With ordinary care, a service life of 50 uses has been indicated for these quilts. This can be increased by extra care in drying and storage between uses. Such care may add as much as 50% to the useful life of the quilts, it is stated.

Cost of curing, taken from the experience of 19 states so far, is placed at an average of 2.15 cents per square yard. This excludes original cost of the quilts but includes labor, supervision, and transportation.

The cost of the quilts is made up of two items: purchase price, and the care taken of them. That is, if they are rolled, folded, or wadded and left damp, in a brief time mildew attacks them and destroys the fabric. Consequently every quilt must be thoroughly dried at the end of use before storing. Often it is possible to do this directly on the slab. But in many sections—particularly the northern states or in winter—the weather is frequently against this procedure, so the quilts must be dried with artificial heat.

Particularly important, thereafter, is regular inspection to make sure that mildew does not set in while stored.

Recently placed orders reported to the Cotton-Textile Institute indicate that cotton quilts will be used on various types of construction projects in such widely separated places as Alaska, Mississippi, New York, and New Hampshire. Thirty-eight State highway departments have now approved their use, and they are now exclusively required in some states, according to the New York Journal of Commerce and Commercial.

Another trend reported is for municipal use. Among recent approvals for these cotton quilts are noted those of R. D. Austin, city engineer of Little Falls, N. Y., who is quoted as regarding them as "ideal for curing curbs, gutters, and sidewalks." As shown in the accompanying illustration, the city of Rome, N. Y., S. H. Zingerline, city engineer, is reported as having specified the exclusive use of these quilts for curing concrete pavement recently laid in that city.

The cotton quilts are manufactured by National Automotive Fibres, Inc., Highway Materials Department.



CUT MAINTENANCE COSTS 75%

Concrete slab maintenance costs can be reduced as much as 75% by the Koehring Mud-Jack Method. The Koehring Mud-Jack raises sunken concrete . . . walks, curb and gutter, driveways, streets, highways, etc., eliminating reconstruction costs. Write for the new Mud-Jack Bulletin illustrating applications and describing the Mud-Jack Method.



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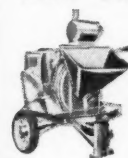
MUD-JACK METHOD

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Built to MIX FASTER RUN SMOOTHER, QUIETER, LONGER



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World's Biggest Manufacturer of Concrete Mixers, All Types, Sizes to 56S.

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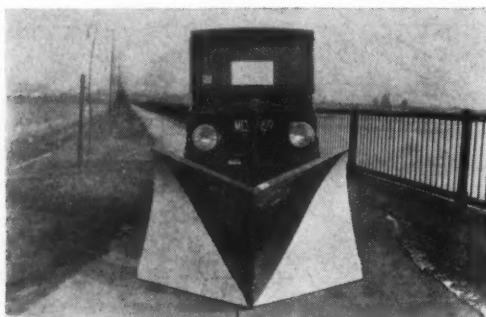


Opening a road with a Frink Sno-Plow

Highway, Street and Airport Snow Removal and Ice Control

A little manual describing equipment and materials available for use by cities, counties and states; for light snows or deep drifts; for sidewalks, roads and airport runways.

WINTER Maintenance is the term that may be applied to snow removal and the safeguarding of slippery areas by sanding or otherwise. Such activities are just as much a modern necessity as surfacing or drainage. If a road is used enough to justify improvement, or an airport is of sufficient importance to warrant grading and either surfacing or subdrainage of the runways and taxi strips, snow removal is indicated. The necessity for removing snow from an unimproved road or from a simple landing field will depend upon local conditions; but in the case of surfaced roads and busy airports, safe winter operation is as important as maintenance, and ought to be provided for on the same matter-of-course basis.



An Anderson V plow; plows to edge of curb

A large variety of snow removal equipment is available. This variety is necessary to provide efficient removal under the various conditions that exist. For instance, the problem of removing snow from a 20-ft. road carrying heavy, high-speed traffic is much different from that of removing snow from airport runways which may be 150 feet or more wide; or from city streets. The removal of snow from narrow, curved and high-crowned rural highways is still a different problem. All of these require special types of equipment for rapid and low-cost removal. It is the purpose of this article to describe the various apparatus available for each type of work. However, it must be remembered that when a major storm comes an emergency is at hand, and all available equipment must be used, regardless of its efficiency for the particular task. Keeping communications open is of first importance.

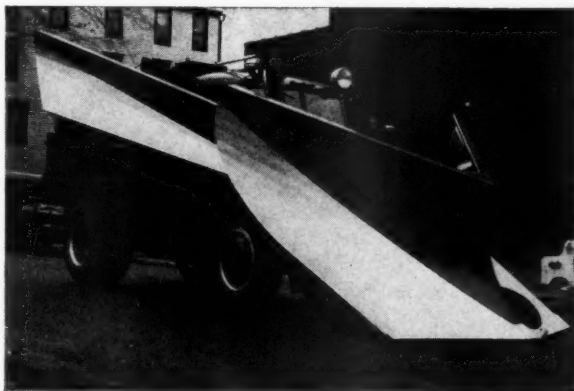
Fortunately, the equipment now provided for snow removal is such that it can be used effectively and with a fair degree of efficiency for quite a wide variety of work. Moreover, a well-balanced stock of equipment will permit a city, county or state to utilize normally each piece for a type of work at which it is most efficient; but in case of breakdowns, substitution may be made to allow the necessary work of snow removal to proceed. Attachments for mounting the various plows on trucks or tractors are uniform, permitting almost any type of plow of a specific make to be attached. This interchangeability is of great usefulness.



WHATEVER YOUR SNOW-REMOVAL REQUIREMENTS, THERE'S A FRINK SNO-PLOW FOR THE JOB. A FEW FROM OUR FULL LINE APPEAR HERE

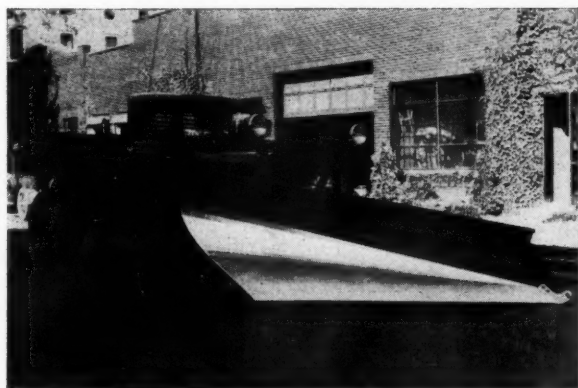
"V" TYPE FOR MOTOR TRUCKS

There's a Frink "V" Type Sno-Plow for every size of motor truck from 1½ tons up to 10 tons capacity . . . 8 models of varying moldboard heights and three different widths at the cutting edge . . . so you can select a size that exactly fits your own snow conditions and the ca-



pacities of your trucks . . . without overloading them . . . and they are all self-

ballasting . . . an exclusive Frink feature . . . available with or without side Leveling Wings . . . hand or full power hydraulic control . . . may be used interchangeably with the blade type Sno-Plows shown below.



ONE-WAY TRIP BLADE TYPE

The Frink One-Way Trip Blade Type Sno-Plow is principally used in localities where the usual snow fall is not sufficient to require the use of a "V" type plow . . . made in five sizes . . . equipped with shock absorbing and self tripping moldboard . . . reversible double wear cutting edge . . . hinged deflector to prevent snow from flying up onto the windshield . . . interchangeable with "V" type or Reversible Trip Blade type using same truck attachments.

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TORONTO, ONT.



Model 148-SP Frink Sno-Plow and model 10-FHR Frink Leveling Wing clearing highway in New York State

A comprehensive description of all the standard types of snow plowing equipment and the varieties of work for which they were designed appeared in the October and November issues of *PUBLIC WORKS* for 1937. Further up-to-date data on equipment produced by the various manufacturers was published in the 1941 Highway, Street and Airport Manual.

Cost of Equipment.—Except for the very heavy units, snow removal equipment is relatively low in cost. The trucks and tractors required to operate snow plows are much more costly, but these are required for normal maintenance, operation and construction work on highways, streets and airports, and are thus available without extra investment for snow removal. If the normal supply of trucks and tractors used for these purposes is insufficient, necessary additional units can be procured through rental, and these require only that the necessary attachments be mounted prior to the arrival of winter weather.

No fixed statement regarding prices can be made, since plows vary in type, size and weight.

Amount of Snow Removal Equipment.—Snow plows cannot ordinarily be rented. There is never quite enough of them available for heavy storms. Therefore the state or county, the city or the airport must provide in advance for its needs. The amount of equipment that will be needed depends on several factors: 1. The area; a state requires fewer plows per 100 miles of highways than a county. A storm is rarely severe over an entire state, permitting equipment to be shifted from a section less seriously affected to critical areas. 2. The importance of the road or airport concerned; for any heavily traveled and vital highway, enough plows should be provided to meet the most severe storm, plus a reserve for breakdowns and accidents, unless the necessary replacements can be drawn from other unimportant areas. 3. The climate; even though severe storms hit Southern states, as was the case two winters ago, the inconvenience and loss resulting from delays due to lack of proper equipment will not justify any large investment in plows where such storms occur rarely. A moderate supply of equipment to clear the most important highways might well be kept on hand, however.

Snow Removal Equipment for Cities

In considering the amount of equipment, it must be remembered that replacements cannot be obtained during the storm. Once the storm comes, it must be fought with the equipment at hand.

The Problem.—The snow that falls on city streets can-

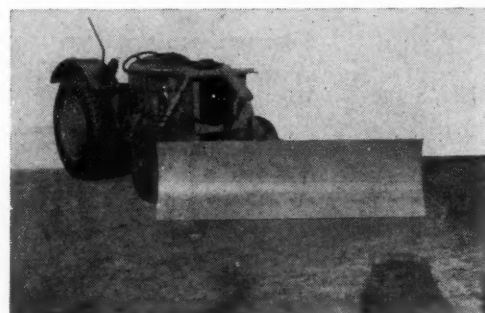
not be thrown by fast plows off and to one side. Instead it must be pushed to the curbs, or piled in the center of the street, to be removed later. Sidewalks—there are two miles of sidewalks for every mile of street—are used by many people and snow should be removed from them. Cross walks must be cleared; also parking areas; and streets and alleys around public buildings. For fire protection, hydrants should be made accessible.

When snow is piled at the curbs, valuable roadway space is taken up, resulting in a reduction in the travelable width of the street. Cars must be parked, resulting in a still more dangerous narrowing of the street; and persons alighting from such cars must either step into deep snow banks or expose themselves to serious danger by getting out of the left doors. Also deliveries and garbage removal are difficult. For these reasons, it is better where the street is wide enough to pile the snow in the center; and then to remove these piles promptly.

Plows.—For city use, the "reversible" blade plow is most widely used. This plow is designed to push the snow and not to lift and throw it, as is the "one-way" plow which has such a wide and valuable application for rural highway work. In sparsely settled areas of the city, the one-way plow may be used, but elsewhere, the low-speed push type is standard. However, at least one make of one-way plow is designed to roll the snow at low speeds and thus may be used effectively for city snow removal work. With the reversible blade plow the snow may be pushed to either side, since the angle of the blade may be changed, as with a trailbuilder or angledozer, and piles built up either at the curbs or in the center.

Reversible blades are not suited to very deep snow—12 to 18 inches is the limit—nor to high speeds. Blades are generally 9 to 10 feet long and designed to clear a width, when properly angled, of $7\frac{1}{2}$ to $8\frac{1}{2}$ feet. Blades are 24 to 34 inches high. Weights vary from 500 pounds for the smaller blades to 900 pounds for the larger units. The blade can be tilted as desired to suit snow conditions. To change the angle or direction of the blade, one or more pins are removed, the blade set at the desired angle (four plowing angles are usually provided) and the pins replaced.

Reversible blades are available for light and heavy trucks, graders and maintainers, crawler tractors and



An Anderson reversible plow for general all-around service

wheel tractors. Attachments usually permit other types of plows to be used if necessity arises.

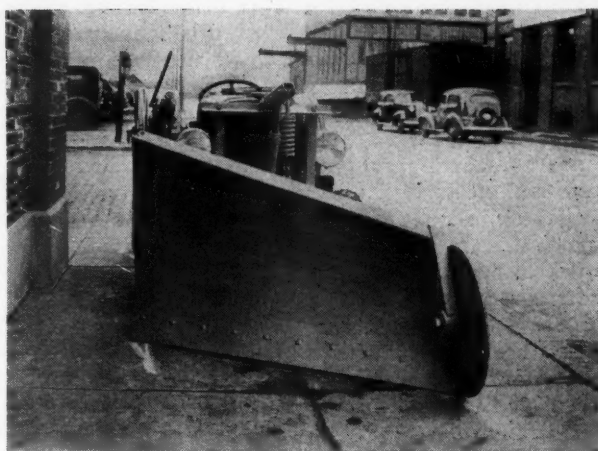
V plows are sometimes used in very heavy snows or in emergencies, but their utility is limited. Bulldozers also are used, but since the blade points directly ahead and cannot be angled, these are useful chiefly in pushing back snow banks from intersections, or for clearing small areas. Angledozer are useful, since the blade can be set at any desired angle. However, like bulldozers, their economical employment is limited. Reversible plows can be mounted on motor maintainers and used effectively in street clearing work. These motor maintainers are heavy and powerful, and should be used only on heavy work; it is more economical to use lighter trucks for light work.

In many cities, some manholes or valve box covers protrude above the street surface. Most plows designed for city work have safety trips so as to prevent injury to either the plow or the structure if it is hit by the plow.

Reversible blade plows are available for light, medium or heavy trucks, crawler or wheel tractors, and graders and maintainers. These are supplied by at least eight manufacturers.

Removing Snow.—The most effective method of removing snow from city streets is to haul it away. For hauling, trucks or large wagons are used. To reduce the cost of hauling, efficient operation of the trucks is necessary, reducing to the minimum the time required for a complete cycle of loading, moving to the dump, dumping and return.

While an efficient arrangement of traffic control to minimize the time lost in going to and returning from the dump should always be provided, by far the great-



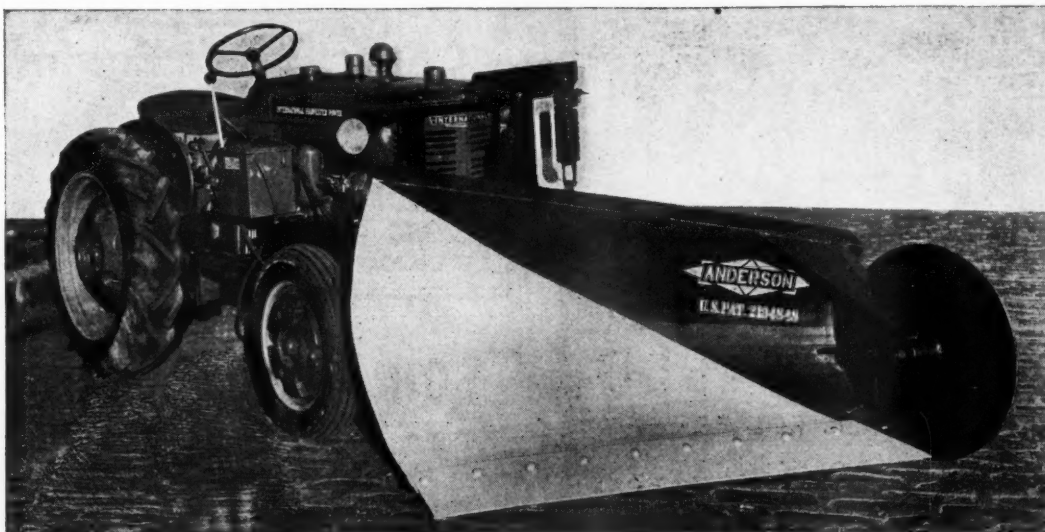
Anderson one-way sidewalk plow with curb climber

est saving is accomplished by quick loading. Trucks for hauling are usually hired by the hour, large trucks usually renting for \$3.00 per hour. If a truck hired at this rate hauls 10 yards an hour, the cost is 30 cents a yard; if, by eliminating loading delays, it can haul 30 yards an hour, which can usually be accomplished, the rate per yard is 10c and the cost of removal will be 1/3 as much.

Hand loading of trucks is never efficient. Small power shovels are a marked improvement and may cut the standing time of trucks to 1/3 of that when hand loading is employed. The most efficient equipment, however, is the conveyor type or bucket loader. Once the snow is pushed into piles, such a loader can pick up the snow—even though it is packed or frozen—and

ANDERSON SIDEWALK SNOW PLOWS

for International Tractors



Model SW37, above, has patented curb climbing feature for both plow and tractor. Plows right up to curb, either up or down. With automatic safety trip that works.

SW38 V Type is a real V plow, built particularly for side-

Standard equipment on all plows are Blackhawk "lightning" lift hydraulic equipment, full vision lift device frames. Power hydraulic operation on special order. Write for literature.

ANDERSON ENGINEERING CO., 21 Charles St., Cambridge, Mass.
ALSO MANUFACTURERS OF TRUCK PLOWS

walk work. Plows clean and to curb—up or down. Requires minimum power in heavy snow.

Model S35 Reversible Automatic Trip for general all-around service. Interchangeable with all other models. Reversible from side to side; will also push straight ahead.

load it into trucks at the rate of 5 to 10 cubic yards a minute. Thus a 10-yard truck can be loaded in 1 or 2 minutes as compared to 30 or 45 minutes by hand, and the resultant saving in cost, which is easily computed, is a remarkable surprise to most folks. As a matter of fact, there are several additional advantages. Since a loader reaches high into the air, and since snow is light in weight, high side boards can be placed on the trucks still further increasing the load they can carry. Most of these snow loaders are designed for a wide variety of uses in construction and in handling materials, and can accordingly be used throughout the year.

A wheel tractor with a short reversible blade is handy for cleaning up after a loader, building up piles that have been broken down by traffic and doing similar odd jobs.

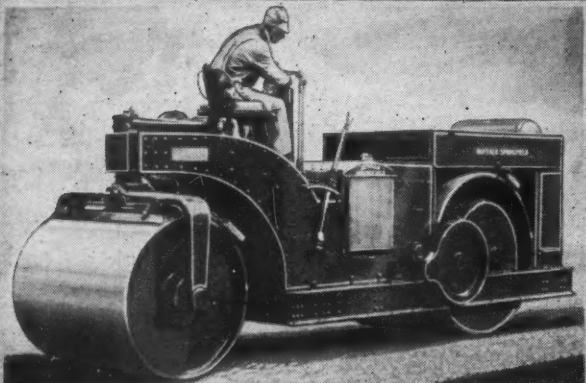
Sidewalk Plows.—Progressive city officials have found that few winter activities are more appreciated by the taxpayer than sidewalk plowing. As a result of this discovery, there has been a remarkable development in narrow-width plows and small tractors. Five or 6 years ago, there were only one or two makers of plows designed specifically for such work; one tractor company had developed a light, narrow-gauge crawler, though there were some light mower-type tractors sold for the work. Now, however, there are at least seven manufacturers specializing in this type of plow and a number of tractors are available.

Either a V or a blade plow may be used. The usual width of cut is about 5 feet. A curb-climbing device to obviate delays in getting across streets is a feature available in at least one model. Another plow by the same manufacturer is designed to plow clean and to

throw the snow clear of the rear wheels of the tractor. One-way, reversible or V plows are furnished, the tractor attachments fitting all these plows. The tractor used is a wheel-type with narrow tread.

Another firm utilizes a small tractor that is steered by handles; this uses either a V or a reversible blade, which are interchangeable; and the blade can be swung to any angle without removing any bolts. The tractor is used for mowing, raking or other work in the summer. For winter work, the plow will handle snow up to 12 inches deep, and is claimed to be able to clear as much walk as 25 or 30 men. For light snows, a power brush can be used instead of the plow. Several other firms also make brooms for sweeping light snowfalls. These may be attached to trucks, tractors or motor graders.

Ice Control and Removal.—When ice comes, there is no substitute for cinders or sand treated with a chemical, such as calcium chloride or salt. The grit and the chemical are mixed in advance and stored for use at a central storage point, and also in small quantities at points of probable need, as on hills, at intersections and railroad crossings. The chemical forms a thin film around each grit particle, with the result that, when spread on the icy surface, the particles are embedded enough to provide effective skid resistance; also, when thus embedded, they resist whipping off the road by traffic or blowing away. Because of these factors, a considerable saving results in the amount of grit required to make and keep a street safe for travel. When thus chemically treated, 1½ to 2 pounds per square yard of grit or abrasive are sufficient. Application by hand is satisfactory, but usually wasteful, and chip or sand spreaders of any satisfactory type are more



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economical. A good spreader will save 15% to 40% of the abrasive, as compared to hand spreading. When using a chemical, it is desirable to follow precisely the directions of the manufacturer.

Various types of blades have been devised to remove ice from streets. Probably the most effective have a serrated or notched edge. These can be attached to motor graders, snow plows, bulldozers, under-truck maintenance or other equipment, being designed to fit practically all of these units. These blades break up the ice or frozen snow; a grader or snow plow should follow close behind to remove the broken up material. In extremely cold weather, an application of calcium chloride or salt will soften the ice and make removal much easier and more complete.

Opening Drive-Way Entrances.—In suburban areas, every householder has an automobile; a driveway connects his garage with the street. Every time the snow plow passes, the entrance to the driveway is choked with heavily packed snow. Every widening of the plowed way in the street results invariably in another stoppage. By the time he has shoveled out his driveway four or five times, the average tax-payer is irate enough to tell the mayor just what he thinks of such a system of doing business, but he is too tired to do anything but collapse on the couch. A wheel tractor and bulldozer could clear out these driveway entrances (not the driveway itself) quickly and save many blisters, lame backs and ruined dispositions.

Equipment for Snow Removal for Counties and States

The Problem.—Counties and States must keep many miles of highways open to traffic, as compared to the relatively few miles of streets in the average city. Therefore, high-speed, fast-moving plows must form

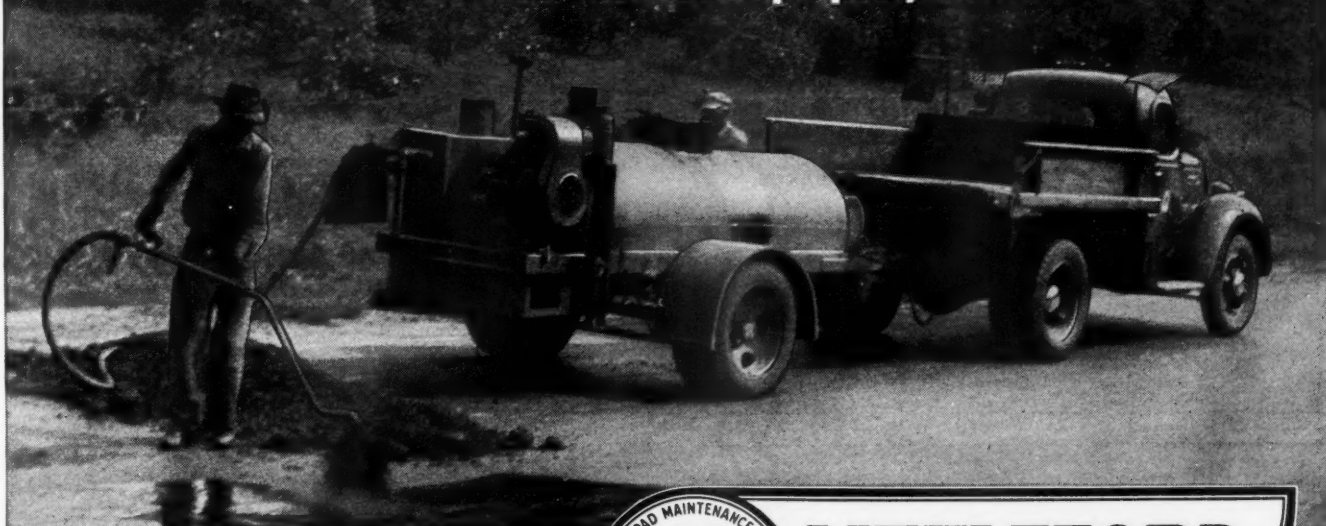
the backbone of the snow-fighting equipment. Snow can be piled along the right-of-way or thrown over into adjacent fields. The aim is to keep ahead of the storm and to prevent enough snow from accumulating on the road surface to necessitate the use of heavier low-speed equipment or to interfere with the safe use of the road by traffic. However, in a severe storm there is rarely enough equipment available to do this and drifts may form on secondary roads, since the main effort during the storm is to keep primary roads open. Therefore, the fast equipment must be backed up by plows that are able to operate under the most severe conditions. In other words, a well-rounded fleet of plows must be at hand. As in city work, additional motive power can be rented; arrangements for this should be made well in advance of actual need and the trucks or tractors equipped with the necessary attachments.

One-Way Plows.—The one-way plow is so tapered and curved that it cuts under the snow, picks it up, raises it above the adjoining snow, and throws it clear of the road. Pictures herewith show how these plows raise and spread the snow, avoiding the formation of side banks which may encourage later drifting. Blades of this type are, or should be, designed so as to prevent throwing of the snow into the truck radiator or against the windshield, no matter what the rate of speed.

The one-way plows are the most economical and effective equipment for snows not more than 12 inches deep. They are standard equipment for improved roads. Common practice is to start a fleet of such patrols shortly after the storm begins and to continue them in operation until the storm has ended and all

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roads are clear. Such plows can do more than 90% of the plowing required on improved highways under average snow and wind conditions, but they cannot handle drifts or snows over 12 or 14 inches deep.

Speed is an important factor in the effective operation of one-way plows—15 to 40 miles an hour being the usual limits. Therefore, they are used only on motor trucks.

Approximately a dozen manufacturers produce plows of this type, varying in size for use with trucks from 1½ to 10 tons. The blade clears a width of 7½ to 9 feet, as a rule. Weights are from around 600 pounds for the smallest units to 2500 pounds or more for the plows designed for 10-ton trucks. Nearly all plows have reversible cutting edges; adjustable moldboards to permit tipping the top backward or forward, to adjust the clearance close to or away from the road surface, and to compensate for cutting-edge wear; shock-absorbing devices; hydraulic or power lifts and controls; and attachments that are interchangeable with other types of plows, as V or reversible. Various means are used to prevent damage in case an obstruction is hit, these usually consisting of a tripping device or some variation of it.

V Plows.—When deep snows and drifts must be handled, the V plow is used. In fact, it is an all-around unit, capable of throwing snow clear of the road shoulders at the higher speeds and also of bucking drifts and widening cuts through deep snow. It is of especial value on unimproved or secondary roads; when a heavy storm occurs, enough equipment is rarely available to keep ahead of the storm, as is done with one-way plows on improved roads. Also, unimproved roads and many secondary roads will not permit the speedy

operation essential to the one-way plow. Furthermore, such roads are often maintained with high crowns and the V plow, which does not have any side thrust, is better fitted for operating on them.

The V plow may therefore be utilized as standard equipment for unimproved roads and as useful and efficient reserve equipment for improved highways.

V plows are made in all sizes for trucks from 1 to 10 tons. The size required depends upon the local condition of snowfall. They are also made in very large sizes for crawler tractors, and the combination of a heavy tractor and a big V plow is effective in handling the heavier snows and deep drifts.

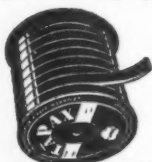
Leveling Wings.—Leveling wings may be attached to trucks or tractors carrying V plows, the purpose being to level and trim off the side banks to reduce the tendency to drift. When the snow is light and not too deep, the wings can be used as auxiliary plowing blades to widen the strip cleared in one passage, and to plow the shoulders. Usually only one wing is used at a time. Controls are provided for swinging it out or in, raising and lowering. Trips are provided to prevent damage if an obstruction, such as a culvert wing wall or post, is struck.

Rotary Plows.—For cutting through deep drifts, cutting back high banks or the removal of deep snow, rotary plows are specially valuable. These have a feed unit which collects the snow and delivers it to a blower which, in turn, discharges the snow. The velocity and angle of discharge are such that the snow is blown 100 feet or more from the road. Within the past few years there has been considerable development in this type of plow. It is now available on trucks from 1½-

(Continued on page 43)

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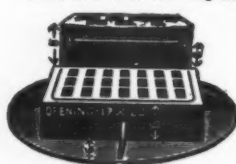
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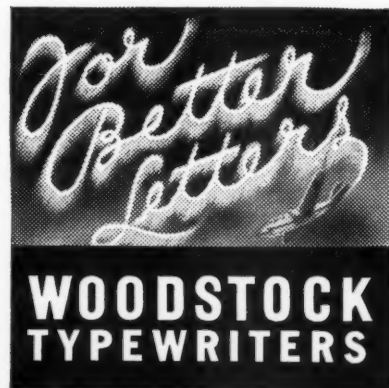


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The County Engineer in Public Health

By E. M. WAYNE, JR.

Public Health Engineer, Walton County, Georgia

Describes some of the activities of a Public Health Engineer and how necessary these are to the welfare of the county he serves.

IN THE days when I was a civil engineer, employed at one time by the highway department, at another working on drainage projects, and later in county and city engineering work, I often wondered just what were the duties of an engineer engaged in health work. What could the "Privy Architect"—as he is often called—find to occupy his time? How could he prove to the County Board of Health that he was an asset to the county budget? Now that I am engaged in Public Health Engineering in Walton County, Ga., I have found the answers to these questions and

will try to describe some of the activities of a Public Health Engineer with the intention of showing how he is essential to the county welfare.

In my own work one of the first routine jobs of the day is a trip by the privy plant (where concrete risers and floors or even entire buildings are made) and a conference with the foreman about new installations. There I observe the work being done and plan for future projects, noting what materials and equipment are needed. A visit may then be made to one of the county schools, where water samples are to be taken, or the sewage disposal facilities checked, with a view to recommendations for improving or rebuilding. In some instances the playground is in bad repair because of poor drainage, and grade stakes may be set with a view to keeping surface water away from the well and buildings and improving the grounds generally. If the school has electricity and running water, a survey and estimates may be drawn up and a project prepared for a septic tank; in which case, when the project is approved and the men go to work building the tank, it is the duty of the engineer to set all stakes for construction and to supervise the work.

Often, in the course of our school inspections, we will find a farmer who desires to improve his well or install a privy or a septic tank for his home. Specifications and estimates for this work will be given by the engineer. The farmer is advised in regard to the procedures necessary for purchase of privies or the construction of septic tanks. The sanitary privies are built at a central plant by the Works Progress



Inside of septic tank made with farm labor

Taking a sample of water at a school for testing



Water tank
at Georgia
Vocational
and Trades School

Administration, and the prospective owner may purchase one or more for the cost of materials involved. (Editorial note: It is understood that only concrete built-in-place tanks are used in Georgia. The editors of PUBLIC WORKS believe that preformed metal tanks are much to be preferred for homes.)

Another phase of the work may involve malarial investigations. If a case of malaria has been reported by a local physician or many mosquitoes have been noted in a community or a town, a survey of the surrounding country is made to determine the location of breeding places. When these have been found, larvae are taken from them and brought to the office for

microscopic identification. If the eggs or larvae are identified as those belonging to a mosquito capable of infecting a person with malaria — generally *anopheles quadrimaculatus* in this area—elimination of the breeding places is advised. In some instances where the area to be drained is small, the land owner or owners may furnish such labor as is needed, the engineer setting stakes and furnishing the supervision necessary for the work. Many times, however, the situation presents a much larger problem. The survey itself may take a month or more to complete. On such projects the county is often called upon to furnish a survey party, the engineer making the survey, plans, and estimates for the project. This service on the part of the Health Department and county will be made as a contribution to the project and the Federal Agency, to which the project is submitted, will match this contribution with materials to be used in doing the work.

The engineer is sometimes asked to accompany the doctor and nurse on a visit to a typhoid case, in which case it is his duty to test the water supply, inspect the methods of sewage disposal and the premises, and to make the necessary recommendations for improvements to prevent further spread of the disease.

Although very little milk sanitation is practiced in Walton county at present, some time is spent each month with the dairymen and a foundation is being laid for future sanitation.

The city of Social Circle, Ga., is constructing a new and modern water plant and it has been the duty of the engineer to assist the city clerk and mayor in gathering the data for this undertaking.

Promotional and educational health work is practiced by the engineer whenever opportunity presents.

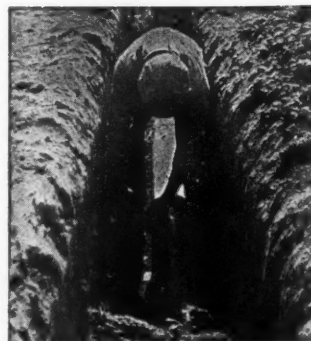


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Work of this type involves attending public meetings and talking before local groups. Some time is spent each month on typhus control. Advice is given on rat-proofing buildings, and poison is given out to those who wish to rid their premises of these pests.

As an employee of the state and county in which he is located, the engineer must give some of his time for public services and affairs not directly connected with his Health Department duties. During the past few months I have surveyed church and school lots, drawn plans for scout huts and school buildings, stake off baseball fields and reconditioned the city swimming pool.

Now to illustrate one way in which the Health Engineer pays his way: On the largest drainage project undertaken by this county and the Health Department this year, the contribution for the engineer's services, comprising surveys, estimates, and part-time supervision, amounted to \$1000 for unit A, the lower half, which will require about six months for construction. At the same time \$1850 has been allocated to this county by the Federal government to be used for farm sanitation. This sanitation will consist of improving water supplies, screening homes, and providing adequate sewage disposal. This money was allotted to our county because the services of an engineer would be available to assure that the work would meet public health standards.

Aside from these outstanding projects, if the total cost of routine jobs, such as septic tanks, privies, and water supplies, were calculated and the legal rate of 5% deducted, the sum of this and of the income from the two projects mentioned above would equal three times the average county Public Health Engineer's salary. Most important of all, of course, is the improvement in health conditions resulting from the work. In this connection should be considered both the money value or cost of sickness and death, and the human factors involved.

All these things and many more compose the duties of the Public health Engineer in his efforts towards making his county a better place in which to live.

Injury by Sewage in Stream

In an action against a sewerage company for conducting a sewerage system in such a manner as to constitute a nuisance through the pollution of a creek which flowed through the plaintiff's land, the Texas Court of Appeals (Bowie Sewerage Co. v. Chandler, 138 S. W. 2d 585) held that the issue of whether any injury had been sustained should be submitted to the jury.

If offensive odors were emitted from the creek and could be smelled by persons who lived on plaintiff's farm, that could be testified to by laymen, as a matter of course, but these facts ought to be established by the jury, in answer to proper questions submitted.

The question of whether or not the waters from the creek emitted disease germs, however, was held to be one for expert testimony. "We say this because many people believe that many diseases are contracted by breathing air, fumes, odors, etc., and by drinking water, when medical science has established the fact that only certain diseases may be contracted by taking them into the human system with one's breath, or by drinking them in.

"We are of opinion that plaintiff should make definite allegations as to the disease germs and make proof of the existence of such germs by witnesses who are competent to testify."



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Force Account vs. Contract in County Road Work

(Continued from page 20)

Ben W. Barber, Mitchell Co.; Maloy Quinn, Clay Co.; G. R. Scott, Bourbon Co.; Guy Hall, McPherson Co.; James M. Loth, Crawford Co.; W. A. King, Shawnee Co. and many others. "More flexible" says Lee A. Hunter, Haskell Co., and C. E. Fesler, Chataqua Co., of force account.

Two Kentucky engineers, H. G. Meiners of Kenton Co., and W. W. Myers of Harrison Co., say contract construction is more efficient; but Bennie Farris of Fleming, C. N. Wood of Scott and William C. Burns of Mercer say force account is cheaper and the county can work to better advantage.

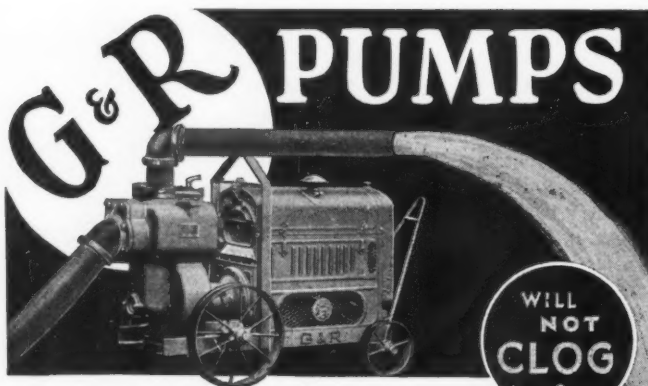
Twenty-one Michigan counties favor force account 17 to 4. It is believed that the WPA is a factor here; several engineers say contract would be better on large jobs, but most of their work is small. Allan Williams, Ionia Co., engineer, thinks contract the best as there is a definite project to show for the money spent. E. J. Allmendinger, Engineer-Manager of Washtenaw Co., says force account permits work to be done more economically and doing this work they are able to keep a trained and able force at all times.

From Minnesota, 43 counties report their likes or dislikes in contract vs. force account; 26 favor contract, 9 force account, and 8 use both. D. R. Savage,

Highway Engineer of Aitkin Co., says "force account permits full control. There is no chance for suspicion of graft. It gives labor to local people. The only objection is that it makes more work for the engineers." G. E. Carlton, Engineer, Mower Co., says "Cheaper to contract, as county cannot afford economical grading equipment. Cost of graveling and rock surfacing same by either basis. Small bridges and oiling can be done by force account.

Missouri is 10 to 2 for force account, so far as reported. In Montana, 4 out of 5 vote for the advantages of force account. Of 14 Nebraska counties stating preference, 11 favor force account. Hershey S. Welch, Surveyor, Lincoln Co., says "most of our roads are built with an elevated grader pulled by a tractor or by motor patrols. The men running these machines are retained from year to year and become expert." New Jersey, 5 counties giving preference, votes 4 to 2 for contract construction on the grounds of lower cost, economy and cheapness. The one New Mexico county prefers contract.

Counties in New York state vote 11 for force account, 1 for contract and 1 for both—in their place. Says Gail Ball, Sup't of Highways for Cayuga Co., "force account gives the workers in each county a chance to participate." Gerald J. Oram, Sup't Putnam Co., says force account permits better control of work and of men. Squire Fitch, well-known Superintendent of Chautauqua Co., says "force account because of (a) construction economy and (b) organization and equipment available for snow removal and emergency work."



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E. J. Mattis, Sup't, St. Lawrence Co., says he favors force account because it permits better control, more flexibility in meeting difficulties, and less argument about proper and substantial work, particularly grading and trimming. "Force account provides employment for local men who would otherwise be on relief and we have found it more economical" says F. Ray Williams, Sup't, Saratoga County. "Force account permits better control and employment of *all* local labor"—Herrick Osborne, Sup't, Warren Co.

North Dakota votes 4 to 1 for force account and among the reasons given are: "Force account is cheaper because we own and operate our own construction equipment, and this machinery, properly operated, cannot but result in less expensive roads"—J. S. Harty, Engineer, Grand Forks, "we can do the work so much cheaper by force account"—L. J. Johnson, Highway Sup't, Traill Co., "the contractor can be held responsible"—E. W. Ackert, Surveyor, Dickey Co.

In Ohio, 29 counties voted—20 for force account, 7 for contract and 2 for both. Reasons given are all about the same, no matter which side of the fence; both contract and force account are rated cheapest, depending on who reports. Oklahoma is 6 to 2 for force account, with 2 dissenting, and some very good arguments quoted. Oregon is 11 to 3 for force account, Pennsylvania, where counties do very little work, is 2 for 1 for contract. South Carolina uses convict labor which, according to L. C. Boone, county engineer, Orangeburg, is better than either. South Dakota votes 11 to 1 for force account. Of 3 Tennessee counties, 2 use force account and 1 convict labor. Texas is 3 to 1 for contract construction, with only 4 counties registering. One Utah county favors contract; 2 Virginia counties agree. In Washington, 14 counties vote 8 to 5 for contract, with 1 county favoring contract for large and force account for smaller jobs. West Virginia is 4 to 2 for force account. Wisconsin is 10 to 2 for force account with 3 using both. Wyoming also favors force account 3 to 1.

Highway, Street and Airport Snow Removal and Ice Control

(Continued from page 38)

ton up, in several sizes; also a special self-contained unit for the heaviest work. In areas of heavy snow-fall, rotary plows are of special value in cutting through deep drifts and in widening cuts to provide both safer travel and better drainage.

Ice Control.—In safeguarding highways against ice conditions, the same general method and materials are utilized as in city work.

Airport Snow Removal

The problem.—Airport runways may be 150 feet wide and the necessity or desirability of removing snow over an area of such width presents a number of problems which differ quite materially from those encountered in highway and street removal. No fixed practice regarding snow removal appears to have been developed, nor has special equipment for such work been designed.

Considering those airports where the traffic demands prompt removal of snow, the selection of the equipment will depend mainly on the depth of snow-fall that may reasonably be expected.

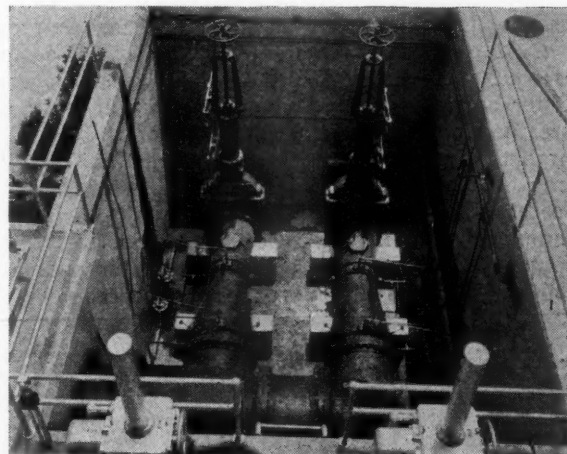
A fall of 6 inches of snow on a runway 150 feet wide amounts to about 3 yards of snow per linear foot of runway. The problem is the selection of the cheapest and most efficient equipment to move the snow off the



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runways, but high banks along the edges of the runways may also be undesirable or dangerous.

Types of Plows.—One-way plows and rotaries seem best adapted to removal of snow from airports. When the snow-fall is not too heavy, the one-way plow, starting in the middle of the runway, can work to the edges, though some snow will have to be rehandled. In the case of heavy falls of snow, the one-way plow will not be so effective. In such cases, a reversible blade plow can be utilized to push the snow to banks for hauling away; or a rotary plow will throw all the snow clear of the runways. One airport was reported completely cleared in 8 hours by one rotary plow; in this case the snow was 6 ins. deep; there were two diagonal runways 150 ft. wide and 3300 ft. long, two other runways 100 ft. wide and 2500 ft. long and a taxi strip 50 ft. wide and 2700 ft. long.

Other Equipment and Accessories

Special Equipment.—Within the past couple of years combined blade plows and rotors have been developed. These can be used either for plowing or for cutting down banks where widening or prevention of further drifting is desired. They may be of value on airports.

Controls for Snow Plows.—Hand-operated controls are out of date. Hydraulic or power controls permit faster and more accurate handling of the plow and greatly reduce the strain on the operator. This is desirable, as snow plowing is hard work and involves long hours. Controls that conserve the strength of the operator, a warm and protected cab and good lighting equipment are desirable investments from every viewpoint. A built-in coffee pot to provide an unlimited supply of hot coffee would please most operators.

Snow Fence.—Traditionally, an ounce of prevention is worth a pound of cure; this is true in snow removal, and fences should be utilized wherever possible to eliminate or reduce drifting. There are numerous styles of snow fence. The principles of location of snow fencing are well known. Natural snow fences, consisting of trees and shrub plantings, have been widely utilized, as has raising the highway subgrade to prevent drifting.

Solving a Difficult Water Supply Problem

(Continued from page 15)

not required there goes to the lake. Or all the water from Clear creek can be pumped to the lake and the plant takes its water from Bird creek.

Of the 10" pipe line from Clear creek to the lake, 5,600 ft. was used cast iron purchased from the city of Madill, Okla. The remaining 7,667 ft. was new steel pipe. The cast iron pipe line was tested every 500 ft. before backfilling. The steel pipe was two weeks late in arriving and 4,000 ft. of trench had been opened up when it was received. The first car load of 3,000 was unloaded, strung, coupled up, "doped" and tested in two days. All pipe connections were made on top of the ground and no work was done on the line after it had been lowered into the trench. For this reason, the trench width was less than is required for pipe which must be joined in the trench.

Hill-Hubbell Co. sent a man to the job to show the pipe layers how to organize the crew, and "make up" the joints. The pipe laying work was organized in the following manner: Two men ahead rolled the joint

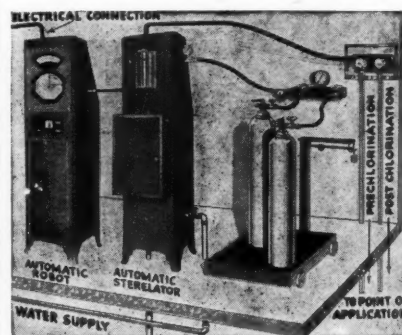
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1. Automatically proportions gas flow to water flow, mixes and feeds chlorine in solution and indicates gas flow.
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3. Operates under **SUBSTANTIAL** vacuum (2 inches of mercury).
4. Completely protected automatic safety devices . . . automatic shut-off, automatic siphon breaks, etc.

Write for Bulletin describing the complete line of manually controlled, semi-automatic and Robot controlled EVERSON SterElators . . . each a better unit for its type of work.

EVERSON MANUFACTURING CO.
213 W. Huron Street, Chicago, Illinois

over the trench onto bridge boards, cleaned and primed the ends and "doped the bruises" (applied hot asphalt on the pipe where the exterior protective coating had been damaged). Following this, one man placed a primed coupling at the end of the joint. Two pipe layers with two helpers then moved ahead, placed the rings on the pipe ends, stabbed the joint and "made up" the coupling with speed wrenches. Two men then bathed the coupling and exposed pipe ends with hot asphalt. The pipe was then lowered into the trench ready to be tested. Joint lengths averaged 46 feet and each joint required about 10 minutes to connect.

An inspector was kept on the job and all pipe was tested before being covered. The testing of the steel pipe was somewhat of a joke to him, for not a single leak was found.

The pump house at Clear creek was a brick upper story with a reinforced concrete cellar for the pump and motor. The pump is a Fairbanks-Morse 1000 gpm at 240 ft. maximum head, 1800 rpm centrifugal, driven by a 75 hp Fairbanks-Morse type Q 2300 V motor. Crane valves were used throughout.

The WPA superintendent was in complete charge of all the work, which was under the supervision of the writer. The WPA's cooperation was excellent, and all workmanship has been good. Credit for planning these improvements is due to W. T. Williams, plant superintendent. The city now has a completely adequate water supply, and when the present work has been completed will have a good distribution system in perfect working order, with all mains, services and meters below the frost line, valves in perfect working order and services 100% metered.

Last Link in Lewis-Clark Highway Under Construction

Because of the formidable nature of the terrain through which the Lewis-Clark Highway passes, a 52-mile section through the mountains of Upper Idaho has never been completed. The final links are now under construction. One 6-mile strip along the Lochsa river is being built by WPA forces under the direction of the Idaho WPA, while not far away another section is under construction by federal prisoners from the Peñal Reservation at Rye Patch Creek.

Inasmuch as the work involves heavy rock excavation, the WPA is furnishing men skilled in the work. Between 125 and 150 will be employed.

Engineers have estimated that 548,000 cubic yards of rock, principally blue granite, must be moved to build the six miles immediately above the camp on the Lochsa river. An examination of a rock cut already completed just below the starting point discloses the solid nature of the granite.

The schedule calls for moving 2,000 cubic yards or over per day, once the drillers and blasters are in full swing. To maintain this it will be necessary to move heavy equipment upstream by barges. In many instances the drillers will be suspended over the face of sheer cliffs by means of safety belts and ropes.

Because of the nature of the work, only experienced men who can pass a rigid medical examination will be used on the project. This project comes under the classification of national defense and men are permitted to work 48 hours per week. Drilling will be carried on in two eight-hour shifts, with six compressors and 30 jackhammers on the job.



LOW-COST SEWAGE AND WATER TREATMENT IN MUNICIPAL AND DEFENSE PROJECTS . . .

JEFFREY - MODERN METHODS - LATEST IN MECHANIZATION

Bar Screens—mechanically cleaned—variety of sizes (combination screen and grinder shown right)

Chemical Feeders—electric vibrating type—weigh within 1%

Flocculants—controlled flocculation—efficient and economical

Grinders—most sanitary method for disposal of screenings—rugged and dependable (installation of screen and grinder at right)

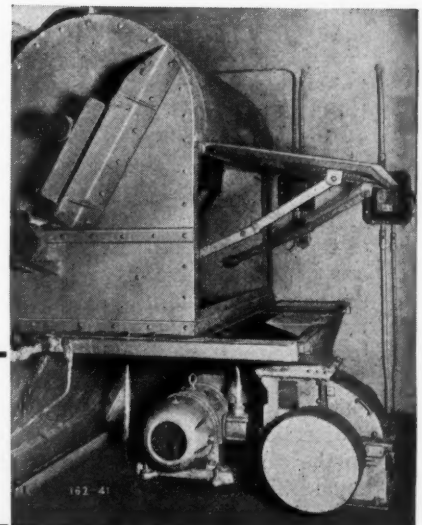
Grit Collectors—V-bucket, scraper or combination—remove grit continuously

Grit Washers—remove 70 to 80% of putrescible solids—two types

Sludge Collectors—for rectangular tank design (see photo above)—straight-line flow

Scum Removers—cross or longitudinal types

Sludge Elevators—raise and feed sludge—maintain uniform level in conditioning tank



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Priorities for Public Utilities

How to obtain OPM assistance in securing critical materials needed in the operation, maintenance and repair of public utilities and highways through preference rating.

MANY materials are now in heavy demand for fulfilling orders for the defense program, and managers of public utilities may find it difficult to obtain such materials, or machinery or other manufactured products of which they form a part. The Office of Production Management (OPM) has created a Division of Priorities to facilitate the acquisition of such materials for uses that are important to the public welfare. This it does by granting "priorities" to users who ask for them and prove their right to them under the regulations.

Unless materials required are on the critical or sub-critical list, it is not necessary to secure a priority rating; and application for such rating should not be made "unless the material to be delivered cannot be secured when required without such rating"; or to obtain deliveries greater in quantity, or on dates earlier, than required for the operation, maintenance or repair of a producer's property or equipment.

Under date of Sept. 17th, the Director of Priorities issued Preference Rating Order P-46, giving special status to industries and services supplying electric power, gas, water or central steam heating, directly or indirectly for general use by the public, and to public sanitation services. The purpose is to facilitate the acquisition of materials for maintenance and repair, and for operation; "maintenance" meaning upkeep of property and equipment in sound working condition, and "repair" meaning restoration of property and equipment to a sound working condition after wear, damage, etc., have made it unfit or unsafe for service; but these do not include improvement of property or equipment by replacing material that is still usable in the existing installation with material of better kind, quality or design, nor additions other than the connection of new consumers or minor improvements needed for relief from serious overload and other minor capital additions.

When a preference rating has been obtained by a "producer" (the individual, corporation, governmental unit or other form of organization operating the utility) he can in turn assign the rating to the parties supplying such material or to those providing such suppliers with materials needed for the purpose. For example, should a water department be granted a preference rating for valves, the rating can be assigned to the valve manufacturer to enable him to obtain the bronze or other metals needed in the manufacture of the valves ordered.

Utilities in communities where defense projects are in progress, if finding it necessary to expand a plant to meet increased demands, should apply for a "Project Rating," which grants priority standing to an entire project for all the "critical" materials that go into it. In the case of water works, if the executive needs to extend his facilities to meet demands created by a defense industry, an Army, Navy or other military

training center, a defense housing project, large increase in population due to defense activities, or deficiency of capacity for other reasons, he should apply for a project rating to the office of the American Water Works Ass'n, 22 East 40th St., New York, N. Y., giving complete information relative to the situation; which application will be taken to Washington by a representative of the Association and placed in the proper hands.

In the case of highways, preferential rating is assigned, in the order named, to access roads, strategic network of highways, Federal aid system, Federal aid secondary and national Park & Forest Projects, the Inter-American Highway and Trans-Isthmian Highway. For priority assistance an application should be made by the State highway department concerned, through the Public Roads Administration, to the Project Section, Division of Priorities, Office of Production Management, for the issuance of a preference rating order.

To obtain the special priority assistance granted to public utilities, the company or municipality fills out a form stating that they are utilities and agreeing to abide by the terms of the Priority Division order and sends a copy of this to the Priorities Division. It may then start using the priority without waiting for a reply, by attaching to orders for materials the statement: "Purchase Order for Utilities Operation, Maintenance and Repair, Preference Rating A-10, pursuant to Preference Rating Order No. P-46." This endorsement constitutes a certification to the OPM that the producer or supplier is entitled to apply the rating to such delivery pursuant to this order; the purchase order, however, not to include any material not rated pursuant to this order. There are a number of provisions, such as that endorsed copies of all such orders must be kept on hand for two years; purchasers and suppliers must submit from time to time to an audit and inspection by the OPM, send it such reports and questionnaires as it may request from time to time, and maintain a continuing inventory of material included in stores accounts.

Further information can be obtained from the nearest field office of the OPM, the addresses and names of the managers of which are as follows:

OPM Priorities District Offices

With the name of the District Manager at each

Boston, Mass., 30 Pearl St., William P. Homans.
New York, N. Y., 33 Liberty St., P. L. Salussolia.
Philadelphia Pa., 925 Chestnut St., Frederick W. Slack.

St. Louis, Mo., 411 Locust St., Louis E. Crandall.
Chicago, Ill., 164 W. Jackson Boul., Warren G. Bailey.

Cleveland, Ohio, E. Sixth St. & Superior Ave., William T. Walker.

Denver, Colo., U. S. National Bank Bldg., Virgil L. Board.

Pittsburgh, Pa., Grant St. & Ogle Way, Charles F. Cruciger.

Dallas, Texas, Wood and Akard Sts., James B. Crockett.

Detroit, Mich., 160 Fort St., West, Walter Hall.

Atlanta, Ga., 104 Marietta St., John B. Reeves.

Cincinnati, Ohio, 34 East Fourth St., Bruce W. Burroughs.

San Francisco, Calif., 400 Sansome St., Andrew L. Kerr.

Seattle, Wash., 960 Stuart Bldg., William D. Shannon.

Kansas City, Mo., Federal Reserve Bank Bldg., Clifford H. Carr.

Los Angeles, Calif., 1151 S. Broadway, G. Howard Hutchins.

Twenty-one more offices are in process of organization.

Streamlining County Highways Lowers Maintenance Costs

(Continued from page 24)

100 to 600 vehicles per day. These highways, all but 5½ miles of which are gravel surfaced, present a very difficult maintenance problem. Many of these roads have to be given a light resurfacing of gravel every year.

Two years ago we built our first stabilized gravel and bituminous surfaced road. This has since been sealed with 0.3 gal. RC3 and surfaced with 20 lbs.

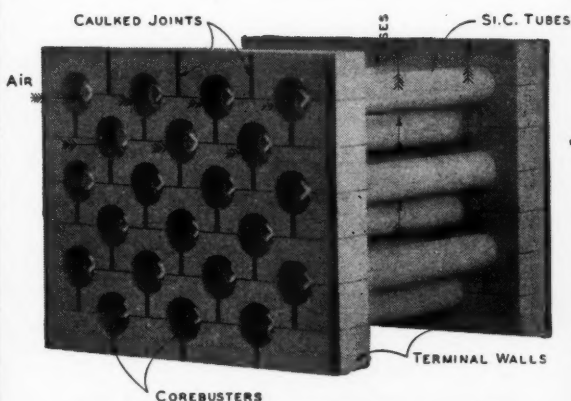
to the square yard of stone chips and pea gravel, graded from ¾ inch to No. 10. This application gives the surface a grey color, which greatly improves visibility for night driving. More of this work is planned for the coming year on our heaviest traveled roads.

All of our construction work is done by contract. The average cost per mile for grading and culverts runs approximately \$2,500; and gravel surfacing, 1,000 cu. yd. per mile, \$400. A 6 in. stabilized gravel base and 130-lb. bituminous mat with seal coat, as described above, has cost us \$3,400 per mile for a 26-ft. finished surface. As much of our work as possible is done on the Federal Aid Secondary program. We find their specifications easy to meet and believe them to be a fine thing for secondary roads. To date we have found that contractors bid the same unit prices on Federal Aid work that they do on our regular county work.

With higher type construction, in spite of increased mileage every year due to taking township roads into our County Aid System at the rate of ten to fifteen miles per year, we have been able to show a steady decrease in maintenance expenditures for the past few years. The following table covering annual costs for construction, maintenance and new equipment will give some idea of what has been accomplished.

		Construction	Maintenance	New Equipment
1941	Estimate	\$ 85,000	\$55,000	\$12,000
1940	"	45,599	64,591	25,887
1939	"	170,061	59,939	8,510
1938	"	60,572	73,542	3,039
1937	"	49,046	64,005	8,179

Even though sixty miles of road have been added to the system in the past five years, our average maintenance costs are steadily declining.



A unit of a Fitch patented recuperator.

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Plainfield, New Jersey

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Make concrete pipe on the job with Quinn Pipe Forms. They can be handled by less experienced labor and produce uniform concrete pipe of highest quality. Quinn Pipe Forms make pipe conforming to A. S. T. M. requirements as to wall thickness and other standards.

Quinn Heavy Duty Pipe Forms are built to give more years of service—sizes for any diameter pipe from 12 to 84 inches—tongue and groove or bell end pipe—any length. Backed by over 30 years of service in the hands of contractors, municipal departments and pipe manufacturers.

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Our Heavy Duty type with Adjustable Locks is shown above. Quinn Heavy Duty Forms are also available with a new Wedge-type lock.

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Head house of Sacramento, Calif., water supply.

The Waterworks Digest

Abstracts of the main features of all important articles dealing with waterworks and water purification that appeared in the previous month's periodicals.

Softening at St. Paul, Minn.

St. Paul placed in operation in January 1940 a softening plant by which 8,500 million gallons were treated that year, reducing the hardness from an average of 172 ppm to 87, at a cost for chemicals of \$3.51 per mg. About 10% of the hardness was non-carbonate. Mississippi water first passes through 4 storage lakes of 6 billion gals. capacity. Alum and lime are added, then the water is aerated with compressed air for odor removal, passed through an over-and-under baffle and mixed in a flocculator. Sludge is separated in two 150 ft. circular clarifiers and part pumped back to the point of application of the lime, giving a 12% to 15% saving in lime. The water is stabilized with CO_2 obtained from the stack gases of the power plant purifier by scrubbing and drying, and applied both to the water leaving the clarifiers and into the clear well water. Chlorine is added in the clear wells. Sufficient lime is used to produce an over-treatment of 15 to 30 ppm caustic and normal carbonate hardness. Carbonation before filtering reduces the pH to 9.0, and that in the clear well to 7.5, minimizing the possibility of deposits and removing causticity. At first the softened water broke loose a quantity of calcium carbonate scale deposited by the previous unsoftened water, giving some trouble by clogging plumbing fixtures, but this lasted only about 6 months.^{E12*}

Financing Main Extensions

In financing water main extensions, the prevailing practice is for the department to furnish a portion of the funds, the consumer to pay the balance, to be refunded to him later; the amount to be expended being established by capitalizing the anticipated or guaranteed revenue on a gross percent return basis. This percentage should include estimated investment on all supply facilities in addition to the mains, and also operating costs. An average of the various items involved may be taken to be 5% net return on investment; twice as much in-

HOW TO FIND ORIGINAL ARTICLES. Key letter at end of each digest refers to name of publication listed in bibliography at end of this section. Numeral indicates title of article.

vestment in other supply facilities as in mains; operation requiring 40% of revenue, leaving 60% available for net return. Then the percentage return on gross revenue should be three times 5% divided by 0.60, or 25%. If the minimum relative cost of other facilities were 30% and net return 4%, the percentage return on gross would be 8%; or, using maximum figures, it would be about 42%; which two figures may be taken as the probable extremes.^{A105*}

Metaphosphate In Wichita, Kan.

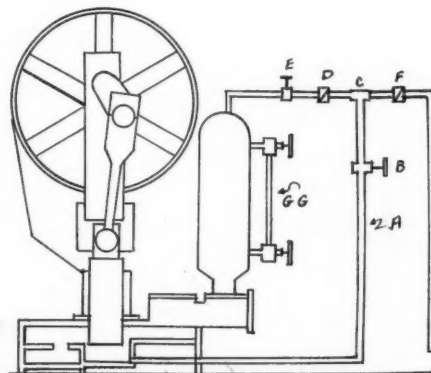
Wichita's supply is from 25 wells, the water from which varies in hardness from 115 to 250 ppm, alkalinity from 133 to 269 ppm. Ferrous sulfate is used as coagulant. The hardness is principally calcium carbonate. Raw water leaving the aerator has a pH of 7.90 to 7.95 while the calcium carbonate stability test requires a pH of about 7.8. On the basis of alkalinity there was an average loss of 8 ppm, which might cause stoppage of services and meters with calcium carbonate. Lime was added to bring the pH to a new equilibrium point of 8.18, 1.6 to 2.0 gpg being used to reduce the hardness to 25-30 ppm. Within 90 days hot water lines were being stopped up—in some cases within 30 days. Hexametaphosphate was applied, first at a 2 ppm rate for 30 days, reduced gradually to 0.5 ppm. Samples were collected from several hot water systems at 2 hr. intervals and tested for loss of alkalinity. Within a week alkalinity drops through the heaters had stopped. Tests were made in 15 experimental hot water heaters; in those receiving city water without hexametaphosphate, calcium carbonate deposition varied from 0.5 ppm at 60° C. to 22 ppm at 100° C.; while in those receiving treated water there was no deposition. Hexametaphosphate treatment began Dec. 20, 1940, and these results were reported in March, 1941.^{A98}

Pollution of Subsurface Water

The extent of travel of pollutants in ground water is limited in direction, distance and intensity; the limits being controlled by the environmental conditions affecting bacterial metabolism and the nature of ground water flow in both the zone of aeration and the zone of saturation. The visibility of the organisms in an unnatural environment is important. The slope of the time-concentration curve is influenced by temperature, pH, moisture and food supply. The more unfavorable these conditions are, the greater will be the diminution in the number of living organisms. The time of ground water flow between the source of pollution and the source of water supply is influenced by precipitation, porosity of the soil and rise and fall of the water table. The filtering capacity of the soil and the clogging of interstices between grains affect the travel of pollution. Careful experimentation has provided a quantitative measurement of the travel of pollution under certain conditions.^{G35}

Keeping Air in Pump Air Chambers

To prevent deficiency of air in the air chamber of a pump, the "sniffer" is recommended. (See cut). Install a $\frac{1}{2}$ " line A from drain to a point slightly above the top of the air chamber, with globe valve B in the line. At the top of this line install a tee C with one end connected to top of air chamber by a line containing

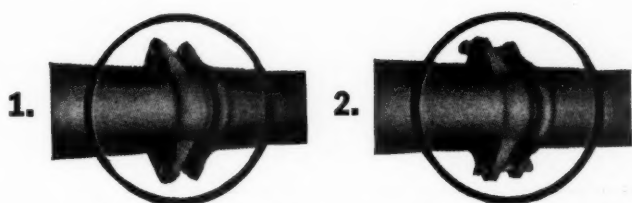


Courtesy Water Works & Sewerage
Sketch showing the method of installation of the "sniffer" on a triplex plunger pump.

*See Bibliography in September Issue.

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pipe jobs with . . .

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1. Spigot End Hub End
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2. The finished bolted joint.



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Use Universal Cast Iron Pipe for Water Supply Lines, High Pressure Fire Lines, Distribution Lines, subaqueous intakes and outfalls and pressure sewers for Airports, Army Bases, Municipalities, Power Projects and Factories. Made 2" to 30" in diameter. And don't forget the long service life for which Cast Iron Pipe is famous.

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a globe valve *E* and check valve *D* permitting flow toward the chamber. At the other end of the tee install a 6" nipple and check valve *F* permitting flow toward the chamber, followed by a 90° elbow and ½" pipe reaching almost to the floor. Install gauge glass *GG* of the side of the air chamber. When the air needs replenishing, open valves *E* and *B* and the pump will do the rest.^{G34}

Producing CO₂ by Submerged Combustion

Submerged combustion for producing CO₂ for recarbonation has been operating at the Quincy, Ill. plant 8 to 16 hrs. daily since March 4, 1941. The burner, 3" diameter and 30" long, located 8½ ft. below the water surface, can produce 2330 lb. of CO₂ in 24 hrs. The blue under-water flame can be seen through a sight glass. The CO₂ has varied from a maximum of 10.8% to a minimum of 10.4%.^{G33}

Flexible Treatment For Varying Hardness

The water used as a source of supply by Dalton, Ga., varies in turbidity from 15 to 2500 and in hardness from 25 to 121. For softening during low turbidity, high alkalinity and hardness periods, ferric sulphate and lime are used; but with high turbidity and low alkalinity and hardness, coagulation with aluminum sulfate was used, since the other treatment did not give proper coagulation. Provision was made to maintain a chloramine residual of 0.5. At first, recarbonation

was not employed, but within a month after softening began the water was found to be encrusting the distribution system, and recarbonation was begun. During a 24-hour period in May the turbidity of the raw water varied from 20 to 2500 and the hardness from 121 to 48, but the hardness of the finished water was maintained between the limits 58 and 60 ppm. By using hot water to dissolve the ferric sulphate before it was introduced into the premix, it was possible to reduce the amount used by one third.^{F94}

Civil Service In Canada

No Canadian city has any civil service system comparable to those in force in a number of the larger cities in the United States. The only extensive civil service is that of the federal government. The majority of municipal utilities are managed by elected or appointed commissions that function through a manager. In them many of the advantages of civil service are obtained otherwise; pay scales are controlled largely by the labor unions, except for engineers and executives and the grading and promoting of these "surely can be accomplished much more fairly by a commission and manager than by a set of rules based on classes and seniority." In Canada the salaries of technical and professional men under civil service in the federal government are definitely lower than those of similar employees of the Ontario Hydro-Electric Power Commission. It is suggested that civil service commissions have not the courage to establish

adequate salaries in the higher range of scale. "Too many rules and regulations, too much regimentation, is not democracy."^{A128}

Interconnections for Defense in New Jersey

Of New Jersey's population, 98% is supplied by 273 water supply systems; 33 of them in the northern metropolitan district and 60 in the southern metropolitan district. A sub-committee of the New Jersey Defense Council found that water works officials considered inter-connections between adjacent water supply systems to be one of the best protective measures against failure of the water plant due to an emergency. In the northern metropolitan district 151 separate municipalities are served by the 33 systems and there are 211 inter-connections, 103 in constant use but many of them too small. However, quantities up to 25 mgd may be transferred between some of the larger supplies. To assure reasonable transfer of water, several new larger inter-connections and a number of small ones are necessary; which will not only be of inestimable value at present, but many will become essential in the transmission and distribution of water from future sources of supply, to be developed to meet the steadily increasing demand for water, augmented by the many war industries in the state. Guaranteeing the continuity of defense activities demands an adequate water supply, which in turn requires full cooperation and coordination of facilities. Existing water pressure elevations permit

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many one-way transfers of water but tend to prevent interchange and the existence of reduced sizes of mains at municipal limits lessens the value of some otherwise useful points of inter-connection. ^{A119}

Effect on Pipes Of Corrosion Treatment

A very delicate chemical and biological equilibrium exists inside a distributing system and any drastic change in the condition of the water sent into the system alters this equilibrium, with results ranging from minor, undetectable changes in the quality of water delivered, to extensive sloughing of pipe deposits with resulting red or turbid water, increased bacterial counts and serious taste and odor problems. These effects may be produced by anti-corrosion treatments, chlorine, and even by filtering where the water previously was unfiltered or when the pH of the water is changed. The effects are more likely to be experienced if the water previously contained little or no residual chlorine and heavy slime growths in the mains were probable; and where the mains had acquired heavy internal incrustations of ferric and manganic hydrates, those due to corrosion being most likely to be affected by increased chlorine dosage. ^{A120}

Tests of Tank Coatings

Tests of paints for water tanks conducted by the Pittsburgh-Des Moines Steel Co. led to the following conclusions:

Cleaning. On new work where the mill scale is not cracked or otherwise impaired in fabrication, cleaning by wire brushing is sufficient. On new work where the mill scale is impaired its removal is imperative, either by sand or shot blasting, pickling or weathering or by flame cleaning followed by power wire brushing. On old work where the steel has become rusty, complete removal of the rust either by sand or shot blasting, or by flame cleaning followed by power wire brushing, is essential to satisfactory paint life. **Surface treatment.** For new work maximum paint life may be obtained from surfaces which are pickled and then given a phosphoric acid treatment before painting. For old work, brush-applied phosphoric acid solutions appear to have a definite value.

The protection of inside tank surfaces by the cathodic method is recommended in preference to painting. For the protection of outside tank surfaces, of 164 primers tested, 12, made by ten different firms and described in the paper, were found satisfactory for paints of either linseed oil or synthetic resin vehicle types. ^{A122}

Preparing Research Reports

In preparing for publication articles describing research work, the following criteria are suggested: 1. The research must be of general interest in its field. 2. The experimental work must be of un-

questionable accuracy and originality. 3. The experimental data must be compiled and conclusions drawn with meticulous intellectual honesty. 4. All pertinent results, whether or not they are in accord, must be included. 5. Tables, graphs and charts must be prepared in as clear and as brief a manner as is consistent with adequate presentation of data. 6. Simple, direct and correct English must be used. 7. Adequate directions and descriptions must be included and unnecessary details omitted. 8. Recognized scientific terms must be used. 9. Be your own severest critic but welcome also the criticism of others. ^{A117}

Cathodic Protection Of Water Tanks

To keep a steel water tank from rusting, a potential must be applied from an external source which is in excess of the natural hydrogen overvoltage potential of the metal. It has been found necessary to maintain a current flow at 3 amp. for every 10,000 sq. ft. of submerged surface of metal.

Anodes are made of stainless steel, of graphite or carbon, or of cylindrical containers of spun glass cloth filled with coke breeze. The chief difficulty to date is with damage to anodes by ice. Many recent installations have used externally applied electrodes.

It is believed that the following refinements will soon be developed. 1. New electrical circuits for this type of protection, which will be superior to anything

HEAVY-DUTY INCINERATION MORSE BOULGER DESTRUCTORS

FOR THE

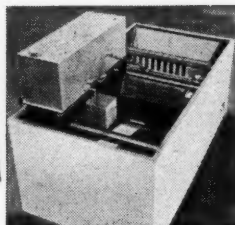
INCINERATION OF MUNICIPAL WASTES

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WIDELY ADAPTABLE... EFFICIENT...
SIMPLICITY OF OPERATION...
ONLY ONE MOVING PART.

Picture shown with
seal-tight cover off.



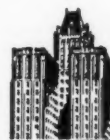
Simplicity in construction, operation and maintenance is typical of Furby's Proportioner. Operated by gravity flow of water to be chlorinated. Originated for Federal CCC camps it is now adaptable for wide use in—smaller municipalities, industries, construction projects, tourists camps, recreational areas, housing units, swimming pools and army camps. Additional unit may be installed for clarifying agent. Let us tell you about it. Write—

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PROPORTIONER CO. 520 S.W. 6TH AVE. PORTLAND, ORE.**

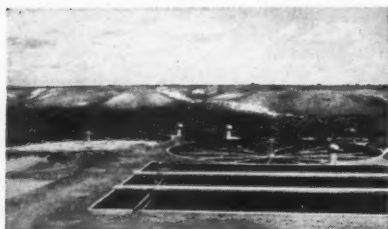
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now in use. 2. New types of electrodes, which will be relatively indestructible, for immersing in water as the anodes of these circuits. 3. The externally applied electrode will be so improved that it can be used on tanks where electrical protection would otherwise be impossible. ^{Allis}

Bibliography of Waterworks Literature

The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.

c. Indicates construction article; n, note or short article; p, paper before a society (complete or abstract); t, technical article.

A Journal, American Water Works Ass'n

- September
114. Defense of Water Supply Works. By N. J. Howard. Pp. 1479-1480.
 115. Public Relations Begin at Home. By J. C. Mellett. Pp. 1481-1488.
 116. Social Security Legislation and Retirement Planning Affecting Water Works Employees. By D. L. Maffitt. Pp. 1489-1496.
 117. Critical Appraisal of Experimental Work. By J. F. Norton. Pp. 1497-1502.
 118. Experiences With Cathodic Protection of Water Tanks. By J. C. Keith. Pp. 1503-1516.
 119. Water Supply Defense in New Jersey. By H. T. Critchlow. Pp. 1517-1533.
 120. Progress in Water Conditioning Methods to Inhibit Corrosion. Committee report. Pp. 1534-1540.
 121. Program for Research on the Effects of Electric Grounding on Water Pipes. By R. Eliassen. Pp. 1541-1552.
 122. Experimental Studies of Tank Coating Materials. By J. O. Jackson. Pp. 1553-1564.
 123. Progress in Plumbing Standardization. By M. W. Cowles. Pp. 1564-1585.
 124. Protection of Buffalo's Pumping Station Against Service Interruption. By L. A. Bergman. Pp. 1586-1588.
 125. t. Determination of Nitrates in Water by Modification of the Phenoldisulfonic Acid Method. By T. C. Hoppe. Pp. 1589-1590.
 126. The Values of an Adequate Civil Service System. By J. B. Probst. Pp. 1591-1595.
 127. The Limitations of Civil Service. By H. A. Van Norman. Pp. 1596-1608.
 128. Discussion on Civil Service. By E. V. Buchanan. Pp. 1609-1611.

E Engineering News-Record

- September 11
13. Ozone Reduces Water Odors and Tastes (at Whiting, Ind.). By A. W. Consoer and J. G. Nellis. Pp. 93-95.
 14. Flow in Pipe Networks by Direct Determination. By J. A. Conklin. P. 96.
 15. Water Pipe Leaks Plugged With "Jelly." By H. H. Eymmer. P. 97.
 16. Double Cone Precipitators Soften Water at Minneapolis. By J. A. Jensen. Pp. 98-100.
 17. Floating a Pipeline Into Place. By H. U. Fuller. Pp. 101-102.

F Water Works Engineering

- August 27
31. Philadelphia Meets Its Water Problem. By N. B. Jacobs. Pp. 1044-1049.
 32. Tunnel Dug Into Mountain for Water. By J. R. White. Pp. 1050-1051.
 33. An Automatic Weeding Machine. By W. A. Crouse. Pp. 1054-1064.
 34. Tests Conducted on New Alloy Pipe. By J. A. Dwyer. Pp. 1055-1057.
 35. Booster Pumping Station in an Unusual Setting. By H. Fox. P. 1063.
 36. Treating a Colored and Highly Corrosive Water. By R. H. Corey. P. 1064.

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37. Main Placed in Record Time (at Denver, Colo.). By J. Burgess. Pp. 1120-1121, 1176.
38. Operating and Maintaining Valves. By J. C. Detweiler. Pp. 1122-1123.
39. Swift and Ware Rivers Ready to Serve Boston. By K. R. Kennison. Pp. 1124-1127, 1177.
40. Meter Practices at Louisville, Ky. By L. S. Vance. Pp. 1128-1130.
41. Meter Practices at Pittsburgh. By J. H. Kennon. Pp. 1131-1132, 1178.
42. How New York City Tests Vacuum Breakers. By O. J. Burke. Pp. 1133-1136, 1179.
43. A Check on Cross Connections. By L. A. Bergman. Pp. 1137-1139.
44. Solving a Flashy Water Problem (at Dalton, Ga.). By C. W. Jones and W. L. Avrett. Pp. 1140-1142, 1181.
45. Developing Well Yield. Pp. 1143-1144, 1180.

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96. National Defense Creates a Water Problem (at San Diego). By F. A. Rhodes and F. D. Pyle. Pp. 1145-1146, 1180.

G Water Works & Sewerage

- August
33. Submerged Combustion for Recarbonation at Quincy, Ill. By W. R. Gelston and E. W. Douglas. Pp. 349-351.
 34. The Air Sniffer. By D. R. Taylor. P. 352.
 35. Basic Factors Affecting the Pollution of Subsurface Water. By L. C. MacMurray. Pp. 360-363.
 36. Chlorination Equipment for Emergency Use. By H. A. Faber. Pp. 365-368.
 37. p. Water Meter Maintenance Practice. By A. P. Kuranz. Pp. 369-371.

J American City

- September
18. Underground Booster Stations Feature Dual Water System. By T. R. Kendall. Pp. 45-47, 85.
 19. New Steel Filtration Plant at New Britain, Conn. Pp. 62-64, 85.
 20. Municipal Pumping and Lighting With Diesels. By W. H. Gottlieb. Pp. 70-71.

L Civil Engineering

- September
6. Artesian vs. Surface Supply: Ogden River Project. By R. R. Woolley. Pp. 536-537.

M Water and Sewage

- August
24. p. Studies in Corrosion Control at Ottawa, Ont. By H. P. Stockwell. Pp. 13-20, 50.
 25. Chemical Treatment of Lake Water to Control "Swimmer's Itch." By W. A. Riddell. Pp. 21, 50.

P Public Works

- September
41. Racine Water Works Improvements Paid For From Plant Earnings. By W. A. Peirce. Pp. 15-17, 42.
 42. p. Water Supply and Sewerage at Army Camps. By C. Cohen and W. C. Gaunt. Pp. 23-24, 48.
 43. Moving a Water Main in Conneaut Without Discontinuing Service. By L. Harvey. Pp. 30, 50.
 44. n. Lead-Jointed Cast Iron Pipe in New York. P. 26.
 45. n. Producing CO₂ for Recarbonating at Columbus, O., P. 26.

V Journal, Maine Water Utilities Ass'n

- Special Edition
- Defense Training for Water Works Operators. Lectures as follows:
8. The General Problem of Water Works Protection. By E. S. Chase. Pp. 5-12.
 9. Effects of Sabotage on Utility Plants. By F. E. Southard. Pp. 13-23.
 10. Water Sources and Supply Lines, Including Protection Thereof. By T. R. Camp. Pp. 24-30.
 11. Water Distribution Systems in War Emergencies. By G. E. Russell. Pp. 31-37.
 12. Water Supply for Fire Protection. By P. Charnock. Pp. 38-49.
 13. Development of Auxiliary Supplies, Including Interconnection of Adjoining Systems. By H. H. Potter. Pp. 50-56.
 14. Quick Repairs and Stock Supplies. By M. Thorne. Pp. 57-64.
 15. Power Supplies for Pumping Stations. By N. W. Thurston. Pp. 65-85.
 16. Cooperation Between Fire and Water Dept's. By J. W. Randlette. Pp. 86-92.
 17. Water Supply for Airports and Military Camps. By S. M. Ellsworth. Pp. 93-101.
 18. English Experiences in War Emergencies. By H. U. Fuller. Pp. 102-113.
 19. Requisite Qualities of Public Water Supplies. By G. M. Fair. Pp. 114-126.
 20. Water Purification. R. S. Weston. Pp. 127-134.
 21. Chemical and Bacterial Testing of Water. By E. W. Moore. Pp. 135-141.
 22. Chemical and Bacterial Testing of Water. By J. E. Hale. Pp. 142-144.
 23. Use of Chlorine in Larger Plants. By F. S. Gibbs. Pp. 145-152.
 24. Emergency Equipment for Sterilization and Its Application. By H. N. Armbrust. Pp. 153-158.

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47. Conservation of Texas Waters. By B. F. Williams. Pp. 39-41.
 48. Priority in Use of Texas Waters. By C. S. Clark. Pp. 42-47.
 49. Rejuvenating a Small Water Works System. By V. E. Atkinson. Pp. 47-49.
 50. Pollution Hazards to the Distribution System. By C. R. Harvill. Pp. 52-54.
 51. Pumping Plant Troubles and Their Remedies. By G. W. Gilliam. Pp. 58-61.
 52. Swimming Pool Sanitation. By W. R. Hardy. Pp. 64-68.
 53. Care of Sand in Filter Beds. By D. B. Dickson. Pp. 75-79.
 54. Essentials in the Design of a Water Treatment Plant. By G. R. Herzik. Pp. 80-84.
 55. Sampling of Water Supplies. By A. D. Potter. Pp. 95-97.



Huntington Beach, Calif., treatment plant; Currie Engrg. Co., consulting engineers.

The Sewerage Digest

Removing Sludge From Drying Beds

Aurora, Ill., the third city to adopt the "saddle-bag" tractor for removing sludge from sludge beds, finds the following advantages in removing sludge from 96,250 sq. ft. of beds: It cost \$2260, while track for sludge cars would cost \$3,000. It can be used as a bulldozer or for other purposes. With its caterpillar treads it can travel anywhere to deposit its load. The operating cost per cubic yard of sludge hauled is less than half as great as by track using 1 cu. yd. cars with two men to a car. Two minor objections are that more care is needed to keep the sludge beds well sanded, and the driver is jolted by frozen ground in winter.^{G26}

Details Affecting Plant Operation

These items from a note book collected during 14 years of practice are several score in number. A few condensed samples are given: The operator should be able to see the main units of the plant from the laboratory. Prevailing winds should not be from digestion tank and sludge beds toward laboratory. Screens for all windows and doors should be included in the contract. A washroom with lockers, shower bath, lavatory and stool is essential. So is an adequate, safe supply of water. Stop gates in screen channels should be easy to operate, and permit draining a channel not in service; wooden gates are never satisfactory—if tight at first they swell so they can not be used. Valves on sludge lines should be placed outside the settling tank. Facilities for rodding sludge draw-off lines should be provided. Digester supernatant and waste activated sludge should not be discharged to the primary tank.^{L4}

Difficult Siphon Construction

A siphon 1,000 ft. long between Chelsea and East Boston, Mass. cost about \$1,000,000 to construct because of difficulties. Three lines of 60" concrete sewer were laid in a tunnel 50 ft. below mean low water across a creek and railroad

HOW TO FIND ORIGINAL ARTICLES. Key letter at end of each digest refers to name of publication listed in bibliography at end of this section. Numeral indicates title of article.

lines. Fine sand, hardpan and boulders were encountered. Compressed air was used not only for the tunnel but also for the lower portions of the shafts, which were over 80 ft. deep. The tunnel, about 10 ft. in diameter, was built with a shield.^{E15}

Sewage Pumping At Jonesboro, Ark.

Jonesboro is constructing a treatment plant with a design capacity of 1 mgd. In bringing the sewage to it from the east side of the city, two lift stations are necessary; one with a capacity of 150 gpm lifts the sewage from a college and CCC camp to the second, which in turn lifts this and 250 gpm additional through 2440 ft. of 10" cast-iron pipe against 32 ft. dynamic head, to a gravity line that takes it to the plant. These stations were made as nearly automatic as possible. The operation of the entire plant is handled from a control panel located in the main office, which contains incoming power and light breakers with thermal and instantaneous trips; breakers and magnetic motor starters with overload relays and red indicating lights, for the three raw sewage pump motors, two sludge pumps, comminutor, two primary and one secondary clarifiers, digester motor and space for future units; watt hour meters, for power and lighting circuits; three position selector switch for changing the operating sequence of the three raw sewage pumps as well as hand-off-automatic control station for each of these pumps, which are normally operated by a Type SW-3 Floatrol switch; time switches and hand-off automatic control for the two sludge pumps; heavy duty start-stop panel mounted push button stations for the comminutor, primary and secondary clarifiers and digester motors. All building and yard lighting will be controlled from a no-fuse panelboard mounted on the control panel.^{H47}

Storage Sewage In Detroit's Interceptor

The interceptor bringing Detroit's sewage to the pumps feeding the treatment plant is 12 miles long and 16 ft. to 5 ft. diameter, and discharges directly into the pump well. By keeping this well filled to the top of the sewer, regardless of the amount of flow, the pump lift was maintained at a minimum, effecting a power saving of as much as 20% at times. But with minimum flow, the velocity was so low as to cause deposits of large quantities of grit and screenings in the interceptor, which were carried to the plant en masse with the first storm. This caused an increase within less than an hour from a normal load of one ton per hour of grit and 0.1 ton of screenings to 20 tons of grit and 5 of screenings. This so clogged the bar screens as to cause drive pins to shear on the rake mechanism when the rake teeth entered the screen. Also, such screenings contained very much more water and after being ground were so wet that they did not carry well on the belt conveyors; which was true of the grit also. Most trouble was experienced in incinerating the screenings, the greatest sudden change in rate of feed that the incinerators tolerate satisfactorily being about 16%. Moreover, maintaining high suction well levels caused accumulation of a floating mat which reached a thickness of 10 ft.

Therefore this procedure was abandoned, and the pumps are so operated as to maintain a velocity of flow in the interceptor of 3.5 to 5.0 ft. per second. This has eliminated the rapid changes in volume of screenings and grit, and the floating mat in the suction well.^{H43}

Detecting War Poisons in Sewage

War poison materials consist generally of arsenical compounds, heavy metals, cyanides, creosols and phenols, glucosides and alkaloids, and war gases. The war gases of the last war were of three main groups—arsines, mustard gas, and gases that liberate hydrocyanic gas.

If sewage normally high in chloride suddenly shows a low chloride content,

silver, mercury or lead may have been added; sudden increase in chlorides may indicate hydrolysis of gases containing chlorine. Decrease in sulphates may indicate addition of lead or barium salts; increase, the addition of zinc sulphate or war gases. Large increase in oxygen consumed may be due to war gases, glucosides, alkaloids or phenols. Sudden increase in B.O.D. would be due to organic matter in minor amounts or hydrolyzed war gas products; sudden decrease, to the presence of metallic poisons, glucosides, alkaloids and war gases in toxic amounts. War gases hydrolyze in water, causing acid which lowers the pH value. Abnormal amounts of nitrates may be caused by heavy metallic poisons. The use of the spectrograph is the easiest method to determine abnormal amounts of heavy metallic poisons in small amounts and the presence of arsenic above 1 ppm.^{H45}

Sewer Flushing

Flushing water is not effective over any great distance. It is the depth of flow which is most effective in moving deposits; $2\frac{1}{2}$ fps velocity of a stream 1 in. deep may barely move a piece of stone, but if 6 in. deep it will roll it along at 2 fps. The amount released in flushing should fill the sewer at the point of entrance. The velocity decreases rapidly at first, then slowly. The slope of the advancing flush gradually flattens as the distance from the flushing chamber increases,

except where the gradient is sufficient to secure a high velocity. If the sewer gradient is reasonably good, a good flush, rapidly discharged, will keep a sewer clean for at least half a mile.^{D21}

Bibliography of Sewerage Literature

The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.

c. Indicates construction article; n, note or short article; p, paper before a society (complete or abstract); t, technical article.

D The Surveyor August 22

20. p. Sewage Flows and Composition Affecting Treatment. By J. Hurley. Pp. 67-68.

August 29

21. p. Sewer Flushing: Good and Indifferent Practices. By J. D. Watson. Pp. 77-78.

E Engineering News-Record August 28

15. c. Siphon Sewer Built Under Difficulties. By T. A. Berrigan. Pp. 65-67.

G Water Works & Sewerage August

25. Oxidized Sludge Process and the "Equilibrium Index." By E. B. Malory. Pp. 333-344.

26. Reducing the Cost of Sludge Removal. By W. A. Sperry. Pp. 345-347.

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43. Interceptor Velocity Control of Sewage Pumping. By C. L. Palmer. Pp. 460-463.

44. Grit Abrasion Solved at Buffalo. By E. A. Piper. Pp. 464-465.

45. p. Detection of War Gas Poisons in Sewage. By R. F. Goudey. Pp. 466, 489.

46. Experiences With Gas Engines. By R. S. Phillips, M. W. Tatlock, C. G. Hart, H. D. Hutcheson, W. W. Mathews, I. R.

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19. Food-Processing Plants Complicate Sewage Treatment. By T. C. Hill. Pp. 72-74.

L Civil Engineering September

4. Details of Design Affecting Operation of Sewage Treatment Plants. By C. E. Schwob. Pp. 541-544.

P Public Works September

34. Planning a Septic Tank Installation for Airport Sewage Disposal. By R. B. King. Pp. 21-22.

35. p. Operating Percolating Filters. in Series Experimentally in England. Pp. 22, 53.

36. p. Water Supply and Sewerage at Army Camps. By C. Cohen and W. C. Gauntt. Pp. 23-24, 48.

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38. n. Rapid Sewerage at San Diego, Calif. By B. D. Phelps. P. 44.

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36. Sewage, Industrial Wastes and Stream Pollution. By C. Cohen and W. C. Gauntt. Pp. 103-106.

37. Pollution of Surface and Subsurface Waters in a Small Oil Field. By E. Whedbee. Pp. 106-107.

38. Clearing Stoppages in Sewers. By R. R. Cooke. Pp. 112-113.

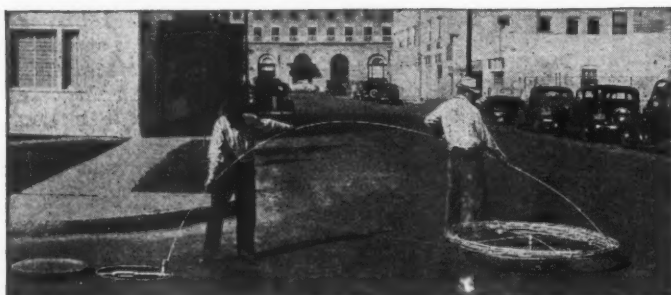
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40. Sewer Extension Design and Construction. By W. D. Bellamy. Pp. 115-118.

41. Odor Prevention at Sewage Treatment Plants. By A. H. Faessler. Pp. 118-122.

42. Pollution of Farm Wells from a Sewer Line. By N. E. Trostle. Pp. 122-125.

43. Municipal Sanitary Status in Texas. Tabulated data. Pp. 127-143.



Here's the Modern Way to Clean Sewers—

Just three simple steps—when you use FLEXIBLES. Eliminate 95% of all sewer dig-ups. Save thousands of dollars. Cut out the back-breaking toil and the useless grief.

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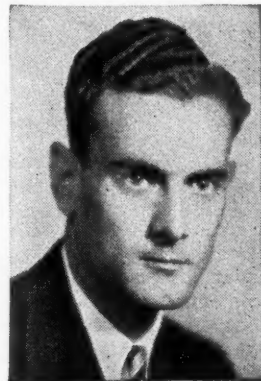
WHY STUART-BRUMLEY CORP.?



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Southern Sales Manager

The above fellows, whom you all know so well as the active personnel behind the Activated Alum Corp., are now planning on bringing to the water works field for the first time a very unusual type of service.

In contacting the water works superintendents, chemists, managers, purchasing agents and engineers around the country in an effort to keep abreast of the developments in the field in order to talk and visit with the users of Activated Alum and Blackalum, we have been asked why we do not represent other products for water works and give as efficient service as we do with Activated Alum and Blackalum.

Around the first of the year we started doing this, and the water works fellows have been very appreciative of the type of service we have been able to give them—as we were all raised in the water works business and know most generally the problems that confront the water works fellows.

We have decided to incorporate a separate company which will handle other items besides alum, as the Activated Alum Corp. will continue to give you the same products and type of service and be managed by the same personnel; but the new products will be handled through Stuart-Brumley Corp.

All of us will appreciate your placing the Stuart-Brumley Corp. name on your list to receive bids for waterworks chemicals.

We respectfully list below the products which we represent, either exclusively with the manufacturers or in such a way as to offer you unusual economies in the purchase of these commodities.

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Activated Carbon
Palmer Filter Bed Agitators
Bleaching Clay

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Activated Calcium Carbonate
Corrosion-resisting Paint
Laboratory Stirring Machines
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*Master Builders Co.
7016 Euclid Ave., Cleveland, Ohio*

Concrete construction on many defense projects is being speeded up through cement dispersion.

In the construction of the magazines or "igloos" cement dispersion has created easier placeability with reduced water content.

"Igloos" are built above ground with the floor at car door level. They consist of a concrete arch roof on concrete foundations with rear and front walls enclosing the arch.

Typical specifications, — archwalls, resting on continuous footing 8 feet wide, are 9 feet 10 inches high, tapering from 25 inches at bottom to 12 inches as springline of the arch. The arch roof, varying from 12 inches thick at springline to 6 inches at crown has a span of 26½ feet and a rise of 12 feet 9 inches.

greater speed in stripping forms and by the shorter curing period required. An interesting example of the savings effected under certain conditions is the reduction by cement dispersion in water required where it has been necessary to transport or purify the water used in the concrete as in arid regions or island bases.

Cement dispersion is the deflocculation or dispersion of the cement particles so that their full surface area is available for reaction. It is obtainable with Pozzolite, a Master Builders Company product.

New Water System Manual Available

*Fairbanks, Morse & Co.
600 S. Michigan Ave., Chicago*

When a rural home owner or one living beyond the city water mains considers using or acquiring a home or farm water system, he usually wants to have



One of hundreds of igloos built by U. S. Army.

Because cement dispersion reduces the water content without sacrificing easy placeability there is less tendency to honeycomb, pocket or produce similar faults. Rigid control of the concrete mix for strength and durability is possible.

Cement dispersion increases the durability of the concrete 50% or more, produces 150% or more increased slump for given water ratio, increases the compressive strength 20% or more, reduces bleeding and shrinkage, reduces permeability and absorption by 20% or more.

Savings in construction cost are effected by the greater ease in placing, by the reduced finishing and patching required, by improved mix design, by

several things explained to him. He wants to know what an automatic water system actually consists of, how it works, what is involved in the installation, what plumbing may be needed at once or could be added later, etc.

To answer these and many other questions, Fairbanks, Morse & Co. have recently published a new book entitled "Manual on the Selection, Installation and Operation of Home Water Systems," which covers its comprehensive subject fully, competently and clearly.

The publishers assert that this manual should save its readers money and disappointments by guiding them away from costly mistakes; that it includes unbiased help in choosing the right type of system from among the many

offered today; that it presents many valuable suggestions on both installing and operating the selected system. The booklet is profusely illustrated and complete in detail.

Copies of the manual may be obtained free on request.

New Chicago Lights Proved Highly Effective

*General Electric Co.
Schenectady, N. Y.*

New pendent luminaires recently installed along Western Avenue Boulevard, in the Chicago Park District, are highly effective according to tests made with the General Electric street lighting evaluator. This instrument, which measures the human eye's ability to see under different lighting conditions, gave the new Chicago system a rating of 12.5. According to G. E. Engineers this is adequate lighting for heavy traffic. In terms of foot-candles, calculations indicate an average illumination over the entire pavement of 0.54 foot-candles.

The new lighting system, provided by the Chicago Board of Local Improvements, uses Form 79-R luminaires with 6,000-lumen incandescent lamps. These luminaires are mounted 26 feet to light center on Union Metal poles spaced 100 feet apart and staggered along the 50-ft. wide concrete boulevard.

Close-Coupled Centrifugal Pumps

Gardner-Denver Co., Quincy, Ill.

The pumps have side suction, single stage impellers. The pump and motor being combined, form a complete, compact unit, entirely assembled and ready for service and are particularly adaptable where space is a factor. These pumps can be installed in any position, that is, on the floor, on the wall or on the ceiling and either horizontally or vertically.

Only the very best materials and the highest standard of design are used in the fabrication. The standard construction is bronze fitted; however for those services where corrosion or abrasion is a factor pumps can be furnished in a wide variety of metals. Correctly pro-



Gardner-Denver Centrifugal Pump.

portioned water passages and special foundry practices insure permanent high efficiency.

Gardner-Denver Close Coupled Centrifugal Pumps have found wide application because of their compactness of design, efficient operation, low price and rugged construction. They are being used for sewage disposal plants, irrigation, golf courses, air conditioning, etc. Ask for Catalog A-202.

Automatic Receipting and Check Writing Machine

*Burroughs Adding Machine Co.
Detroit, Mich.*

A new desk model machine just released by Burroughs brings increased protection, speed, and economy to bill receipting and check writing and signing.

The operator merely slides the check or receipt into the chute, indexes the amount on the keyboard, and depresses the motor bar, the machine automatically writing the date or consecutive number, safeguarding the amount, accumulating the amount in a locked-in total, and signing the form with an authorized signature.

Both the signature die and the accumulated total figures are under lock and key, and the machine itself can be completely locked to prevent its use by an unauthorized person.

For further information, write to Mechanical Methods Division, Burroughs Adding Machine Company, Detroit, Michigan.

The new Burroughs receipting and check writing machine as used in the Wayne County (Mich.) Treasurer's Office for signing and receipting tax bills is shown below.

Big International Truck and Trailer Go Up Pikes Peak

*International Harvester Co.
Chicago, Ill.*

Recently an International K-6 tractor truck pulling a big fully-loaded van-type semi-trailer made an unusual run up to the 14,110-foot summit of historic Pikes Peak. It was the first time that a heavy-duty truck and trailer



First heavy-duty truck and trailer to climb Pikes Peak.

combination such as this had gone up the famous Pikes Peak highway.

With an over-all length of 40 feet and a total weight of 22,000 pounds, it negotiated every hairpin turn, every grade and every switch-back with the greatest of ease. The time for the run from Cascades at the entrance of Pikes Peak Park to Summit House, some 20.5 miles, was 2 hours and 10 minutes. This time was recorded by highway policemen, Coe and Yockey, who accompanied the truck on its record run.

The truck really is a showroom on wheels and is being used by the Denver branch of the International Harvester Company to bring a full display of its refrigeration equipment to fairs, dealers' power farming entertainments, farmers' meetings, etc. Electric power for operating each piece of equipment comes from an International power unit shown back of the cab which operates a 7.5 kw generator.

Illustration shows the big International refrigeration display truck up on the summit. H. D. Cogdell, branch manager, International Harvester Company, Denver (left), is being congratulated on the attainment of the display truck's objective by T. B. Hale, assistant sales manager of Chicago. At far left is shown C. V. Holman of Chicago, in charge of dairy equipment and refrigeration, and H. N. Ross, manager farm equipment sales, southwest district.

Photoswitch Electronic Level Control

Photoswitch Incorporated,

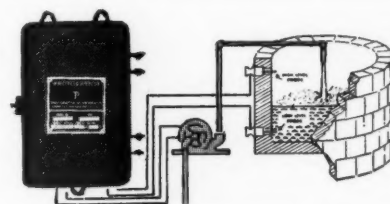
21 Chestnut St., Cambridge, Mass.

Photoswitch Level Control Series P16 provides on and off valve or pump control of any liquid. Complete equipment is available for single level indication and control, on and off pump-up and pump-down control at two levels, boiler feedwater control and low level safeguards. Probe fittings have been designed for high and low pressure and

temperature requirements as well as for sanitary installations.

Photoswitch probes or electrodes are attached to the tank at levels representing the low point where pumping starts and the high level where pumping stops. These probes are wired to Photoswitch Level Control. When the liquid level falls below the lower probe, the Level Control starts the pump in operation and the tank fills. When the level rises to the upper probe, the fluid itself acts as a conductor of the small amount of current required for the operation of Level Control which stops the pump. Even when used with nonconductive fluids, the probe circuit carries only milliamperes of current and low voltage.

Since Series P16 Controls do not involve mechanical float or pressure switches, they are easily installed and maintenance free. New pamphlet 1100 describing Photoswitch Level Control for use with all liquids and powders, and includes several application sketches.



Photoswitch Electronic Level Control.

Portable Air Compressor With Fourteen Distinctive Features

The manufacturer claims that four necessary improvements in its portable air compressor eliminate hard starting even in cold weather, cut out bearing, valve trouble and others which delay completion of a job.

A new folder just issued gives detailed information regarding the fourteen features embodied in the Buhl air compressor. Copies of this folder may be had by writing to The Buhl Company, Old Colony Bldg., Chicago, Ill.



Burroughs Bill Receipting Machine.



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Sewage Works Associations**

HOTEL PENNSYLVANIA

NEW YORK CITY, Oct. 9-10-11



TO consulting and sanitary engineers, public officials and sewage plant operators everywhere, we announce an exhibit that should interest you at the second annual convention of the Federation of Sewage Works Associations, Hotel Pennsylvania, New York, October 9-10-11. We invite you to visit with our representatives and get full details on new developments in sewage treatment, sludge collection, screening, grit washing, mixing and other services.

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305 Washington St. Brooklyn, N. Y.



New office of Pittsburgh-National Meters in Boston, Mass.

Pittsburgh-National Meters Open Larger Boston Office

*E. P. Lufkin, New England
District Manager*

On September first, the National Meter Division of the Pittsburgh Equitable Meter Company will move into their new and larger quarters consisting of offices and warehouse at 708 Beacon Street in Kenmore Square, Boston.

For over 50 years the National Meter Company served the New England area through their Boston Factory branch, for the last ten years at 368 Congress Street in Boston. At the new location, under the name "Pittsburgh-National Meters," a full stock of both Pittsburgh and National oil and water meters will be carried. Parts and accessories as well as complete service and repairs will be available at this new address.

The sales and service in New England will be under the direction of Mr. Eben P. Lufkin, District Manager, whose father was connected with the National Meter Company for nearly 50 years and who served as their New England manager for 35 years prior to his retirement January 1, 1941.

Representatives of "Pittsburgh-National" in the New England territory traveling from the Boston headquarters include Richard H. Smith, Henry L. Weston, D. J. Atwell.

Hyperbolic Weir for Sewage Flow Measurement

*Cochrane Corporation, 17th St. &
Allegheny Ave., Philadelphia, Pa.*

At the Wilmuth Street Station in Lackawanna, N. Y., a Cochrane electric flow meter is installed to measure sewage passing through hyperbolic weirs in two separate flow channels. Because of the advantage the electric transmitting system gives in ability to place the recording instrument at any desired location its application extends to any flow-measurement problem where water contaminated with solid matter prevents the use of orifice-type instruments. Here the single recording-and-integrating instrument measures the total flow in two

channels. The proportional hyperbolic weirs produce a flow directly proportional to the head above the weir base.

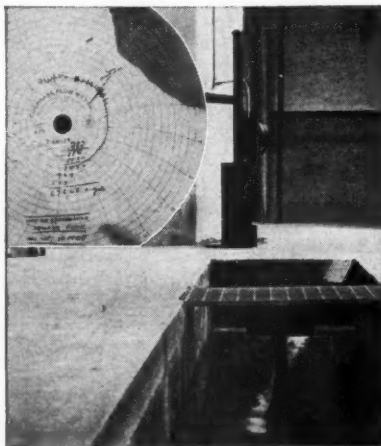
Solids in the sewage total 1,800 parts per million. A series of bars in the approach channels stop the material that might clog the weir notches. This material is removed with a rake and the frequency of cleaning can be read on the chart as momentary flow increases. Normal record close to center of chart to provide a complete record of storm overloads.

Tamping and Leveling Finisher at Camp Custer

*Barber-Greene Co.,
Aurora, Ill.*

Expressing the spirit of the National Defense Program is this Barber-Greene Finisher with one of the Army's new reconnaissance cars beside it at Camp Custer, Michigan. The Tamping-Leveling Finisher is going down one side of the company street laying a 3" base course of gravel while the "Blitz-Buggy" and its larger relatives—including the huge "six-wheeler" transports—use the other side.

With the shortage of facilities and equipment, the Army must conduct its training program in the middle of construction activities. For this reason, contractors are using the most efficient equipment available. The Barber-Greene



Cochrane Hyperbolic Weir.

Finisher, above, is one of two owned by Louis Garavaglia and is equipped with extensions for laying any kind of bituminous mix up to 12 feet wide.

Heavy Duty Buckeye Trenchers

*Buckeye Traction Ditcher Co.,
Findlay, Ohio*

The "biggest bruisers of them all"—the 200 Series Buckeye Heavy Duty Trenchers—are described in Bulletin No. 7B-200. These machines which speedily excavate large trench for intercepting sewers, large mains, street underpasses and other purposes are shown at work.

Auxiliary side cutters can be applied to these machines, enabling them to cut trenches wider than that cut by the buckets. The Model 201 cuts trench 15' deep and 24" to 40" wide, using buckets alone and 60" wide using buckets and side cutters. Model 203 cuts trench 18" deep and up to 72" wide using side cutters, while the Model 260 cuts trench up to the enormous size of 24' deep and 144" wide.

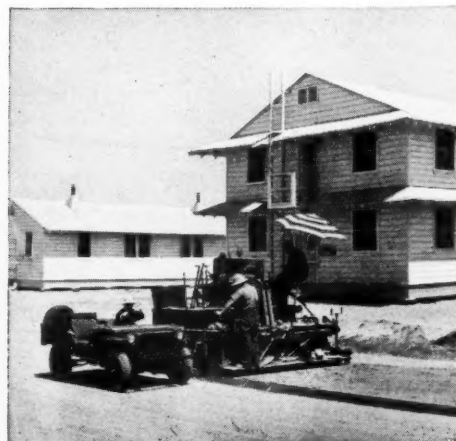
It is stated that all models in the 200 Series have rugged transmissions, simplified controls, non-clogging crawlers and self-cleaning buckets characteristic of all Buckeye Rotary Digging Wheel and Chain Bucket Type Trenchers.

A copy of Bulletin No. 7B-200 will be sent on request to the company.

Handbook on Swimming-Pool Sanitation

*The Mathieson Alkali Works (Inc.),
60 East 42nd St., New York, N. Y.*

This 50-page book, entitled "Keeping the Pool Safe and Sanitary," discusses all modern methods of purifying the water of every type of swimming pool, from the small private pool to large natural bodies of water. It also gives directions for algae control, prevention of the spread of athlete's foot and other infectious diseases, control of pool-water alkalinity, the care of sand beaches, and other details of pool and locker-room sanitation. Methods of testing the pool water for residual chlorine and for pH, or alkalinity, are fully described. Copies can be obtained free on request to the publisher.



Barber-Greene Finisher at Camp Custer.

PEOPLE . . .

Here and There

American Public Works Assn. To Meet in New Orleans

Among the important subjects to be covered at the convention are: Management of Public Works Equipment and Supplies, Operating Results in Combined Disposal of Garbage and Sewage, Public Works Problems in Defense Areas, Progress in Airport Development, Programming Post Defense Public Works, Facts About the Parking Problem—What are the Solutions?, etc.

Norman Hebden, Acting Executive Director, says "the Congress provides an invaluable opportunity to exchange ideas and experiences with more than 400 other outstanding leaders in the public works field. A highlight of the coming meeting will be the session Tuesday morning, October 28, which will be devoted entirely to public works problems in relation to defense activities."

The address of the Association is 1313 E. 60th St., Chicago.

Annual Meeting Virginia Section A.W.W.A.

The 8th annual meeting will be held at Roanoke, Va., October 30th and 31st. Marcellus H. Stow, Professor, Geology, Washington and Lee University, will speak on "The James River Project of the Virginia Academy of Science," Stuart Royer on "Water Supply for Chesterfield County," Col. W. A. Hardenbergh, U. S. Army, on "Defense of Water Supplies for the Army and General Public." Other interesting subjects will be discussed by competent men.

A.W.W.A. Selects Chicago for 1942 Meeting

The 1942 convention of the American Water Works Association will be held in the Stevens Hotel, Chicago, June 21-25, 1942.

E. B. Cape Appointed by Asphalt Institute

W. R. Macatee, Managing Director of The Asphalt Institute, has announced the appointment of E. B. Cape as District Engineer, for the territory comprising Texas, Oklahoma and Arkansas, with office in the Littlefield Building, Austin, Texas.

For the past twelve years Mr. Cape has been employed by the Texas Highway Department—for six years with headquarters at Bryan and Lufkin in the south central and eastern portions of the State, as Assistant Resident and Project Engineer on all types of construction work.

Col. Rockwell Chosen National Councillor

Announcement has just been made that Colonel W. F. Rockwell, President of the Pittsburgh Equitable Meter Company and the Merco Nordstrom Valve Company, Pittsburgh, Pa., has been appointed a National Councillor of the Chamber of Commerce of the United States to represent the Association of Gas Appliance and Equipment Manufacturers.

Through his close contact with the Gas Industry, Colonel Rockwell is in a position to give valuable assistance to the council on its pertinent problems.

Col. W. A. Hardenbergh to Address Several Meetings

Col. W. A. Hardenbergh will speak at five meetings this fall. At the U. S. Public Health Service School for Malaria Control Engineers in Norfolk, Va., October 6th, he will talk on "The U. S. Army's Malaria Control Campaign." His subject at the American Public Health Association meeting in Atlantic City on October 14th is "Sanitary Engineering Work of the Sanitary Corps, U. S. Army." On October 29th he will deliver an informal talk at Virginia Military Institute and on the following day address the Virginia Section of the A.W.W.A. at Roanoke on "Military Water Supplies."

Col. Hardenbergh will be the guest speaker at the annual dinner of the Western Pennsylvania Engineering Society's second annual water purification conference at Pittsburgh on November 3rd. His subject will be "Water Supply and the Army."

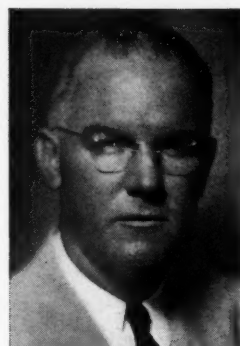
C. R. Cornthwaite Succeeds J. C. Yates

C. R. Cornthwaite has been selected to conduct the research program on use of calcium chloride in concrete at the National Bureau of Standards, as sponsored by the Calcium Chloride Association. Mr. Cornthwaite, formerly research chemist with the National Paint Association and later Asst. Engineer of Materials for the engineer department of the District of Columbia, replaces J. C. Yates who has been appointed inspector for the Cement Reference Laboratory of the Bureau.

Floyd L. Swindell Joins Vapor Recovery Systems

The Vapor Recovery Systems Company, Compton, California, announces the appointment of Floyd L. Swindell as Mid-Continent Sales Representative with headquarters at Tulsa, Oklahoma.

Mr. Swindell is a graduate of the University of Oklahoma, with post-gradu-



Floyd L. Swindell

ate work at George Washington University. He was first employed as Valuation Engineer in the United States Treasury Department, Income Tax

Unit, studying oil and gas reserves, valuation, determination of depreciation rates, obsolescence of oil field equipment and valuation of stock.

During the past fifteen years, Mr. Swindell has been Kansas-Oklahoma editor and staff representative of the Oil Weekly and has been engaged as an independent Consulting Engineer and Geologist.

With his technical background and broad field experience, Mr. Swindell enters the service of The Vapor Recovery Systems Company fully prepared to solve the problems encountered in the control and conservation of gases produced in the operation of sewage disposal.

New Appointments

The following City Engineers were recently reported:

William H. Day, Rockford, Ill.
Halle Shaw, Holly Springs, Miss.
W. D. Fowler, Clovis, N. Mex.
William Piatt, Ashboro, N. C. (P. O. Durham)
Harold Lyon, Oxford, N. C.
K. E. Wedekind, Port Clinton, Ohio.
Russell R. Smith, Sandusky, Ohio.
Roy Grace, Wewoka, Okla.
J. G. Turney, Houston, Tex.
C. W. Borders, Waco, Tex.
Hugh Kelley, Elroy, Wis.

Water Works Superintendents newly appointed include:

J. Gil. Davis, Newport, Ky.
George Brehm, Amherst, Mass.
Frank Driscoll, Chicopee, Mass.
Jules McClelland, North Adams, Mass.
Walter Cheney, Hancock, Mich.
Walter Raleigh, Cohoes, N. Y.
H. M. LaRue, Henryetta, Okla.

Among the new County Engineers are:

Lloyd T. Moore, Sevier, DeQueen, Ark.
Dick Horton, Stanton, Johnson, Kan.
C. E. Dickson, Smith, Smith Center, Kan.
Ed. Bruns, Brown, Aberdeen, S. D.
Enoch Norbeck, Charles Mix, Lake Andes, S. D.
Walter E. McKibben, Stevens, Colville, Wash.

Deaths

Clarence H. Kennedy

On July 21, 1941, after an illness of 8 months, Clarence H. Kennedy died in St. Joseph Hospital, Elmira, N. Y.

Just off the press!

1941 Edition THE MANUAL OF SEWAGE DISPOSAL EQUIPMENT AND SEWER CONSTRUCTION

"A Great Help When Working Up Data on Sewage Disposal"—Say Leading Sanitary Engineers

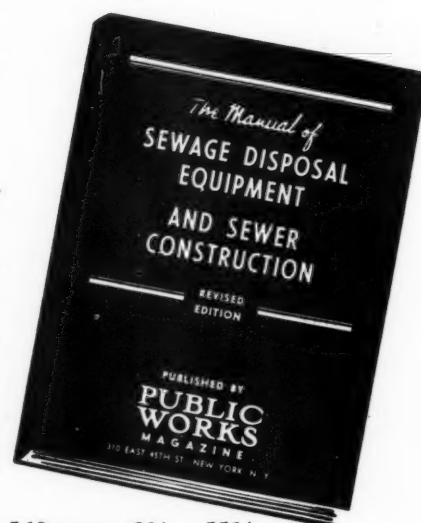
THE Manual is the most complete presentation obtainable in any form of all kinds of equipment and materials used in sewerage and sewage treatment. It is not a catalog, but is a digest of hundreds of catalogs. It lists and briefly describes all varieties and makes of every kind of equipment and material used in constructing and operating sewage plants and sewerage systems, so far as we know. Not only this, but it arranges them in such a way as to be most convenient for reference—by purposes to be served. For example, all kinds of material used in constructing digestion tanks are described in one chapter under that heading. Another important purpose of the MANUAL is to insure its users against overlooking any important equipment or materials entering into the design and operation of sewage plants or sewer systems.

Design Plants That Contain the Latest Devices

Manufacturers are continually making improvements in their products; the descriptions herein are brought up to date of September 1st, 1941.

The Manual is the only book that explains what each product is intended to do and discusses the most approved methods to be followed in each step of design and construction.

All engineers having anything to do with sewage disposal or sewer construction will find this Manual an invaluable guide and reference. If you do not have a copy of the latest edition, send \$1.50 for one today. Money back in 10 days if not entirely satisfied.



160 pages, 8½ x 11¼.
212 illustrations.

What leading Sanitary Engineers say about the Manual

- 1—It is a **GREAT TIME SAVER** when working up all kinds of data on sewage disposal.
- 2—It is a **VALUABLE AID** in explaining the various types of equipment and materials to non-technical officials.
- 3—It is the **HANDIEST BOOK** to use in office discussions concerning the type of equipment and material to be selected.
- 4—It **CONTAINS THE NAMES** of the leading manufacturers of all types of equipment and materials for sewage disposal and sewer construction.
- 5—It is **INVALUABLE** as a textbook for junior engineers.

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Cold Mix Plants

10. New catalog and prices of Portable Bituminous Mixers in 6 to 14 ft. sizes for resurfacing and maintenance. Issued by The Jaeger Machine Co., 400 Dublin Ave., Columbus, Ohio.

Concrete Accelerators

29. "How Cotton Quilts are being used successfully for curing concrete" is a series of reprints from recent magazines available on request from Highway Materials Dept., National Automotive Fibres, Inc., Little Falls, N. Y.

30. "How to Cure Concrete," a forty-seven page manual published by the Dow Chemical Company, Midland, Michigan, treats fully subject suggested by title.

31. New 48-page booklet in five sections explains clearly the effects, advantages and methods of using Calcium Chloride and Portland Cement mixes. Complete and packed with practical information; well illustrated; pocket size. Sent free on request by Solvay Sales Corp., 40 Rector St., New York, N. Y.

33. Pocket manual of concrete curing with calcium chloride. Complete, handy. Contains useful tables, well illustrated. Write the Columbia Chemical Division, Pittsburgh Plate Glass Co., 30 Rockefeller Plaza, N. Y. C.

Concrete Mixers

44. Catalog and prices of Concrete Mixers, both Tilting and Non-Tilt types, from 3½ S to 56 S sizes. The Jaeger Machine Company, 400 Dublin Ave., Columbus, Ohio.

Concreting in Winter

47. "Build Straight Through the Cold Weather Season" explains briefly how to obtain satisfactory winter concrete in less time. Write Michigan Alkali Co., 60 East 42nd St., New York, N. Y.

Drainage Products

70. Standard corrugated pipe, perforated pipe and MULTI PLATE pipe and arches — for culverts, sewers, subdrains, cattlepasses and other uses are described in a 48-page catalog entitled "ARMCO Drainage Products," issued by the Armco Drainage Products Association, Middletown, Ohio, and its associated member companies. Ask for Catalog No. 12.

71. Modern Culvert Practice — a 72 page book containing valuable data and tables will be sent promptly to anyone interested in drainage by Gohi Culvert Mfrs., Inc., Newport, Ky.

72. "3 Answers to Limited Headroom," a comparison of three ways of providing safe strength and adequate drain-

age under limited headroom. For copy ask Armco Drainage Products Assn., Middletown, Ohio.

73. "Principles of Design of Airport Drainage" and other articles on airport drainage reprinted from PUBLIC WORKS Magazine are being distributed free by Bowerston Shale Co., Bowerston, O., Hancock Brick & Tile Co., Findlay, O., and Columbus Clay Mfg. Co., Blacklick, O. Address anyone of the above for a copy.

Mud-Jack Method

107. How the Mud Jack Method for raising concrete curb, gutter, walls and street solves problems of that kind quickly and economically without the usual cost of time-consuming reconstruction activities — a new bulletin by Koehring Company, 3026 West Concordia Ave., Milwaukee, Wis.

Paving Materials, Bituminous

111. An excellent booklet issued by The Barrett Co., 40 Rector St., New York, N. Y., describes and illustrates the uses of each grade of Tarvia and Tarvialithic; 32 good illustrations.

114. COLPROVIA PAVING PROCESSES for non-skid pavements include Plant Mixes by both the Heated and Cold Processes, Road Mix Process and Surface Treatment Process. New literature covering these processes is available from Colprovia Roads, Inc., 183 East Main St., Rochester, N. Y.

Paving Materials, Brick

116. "New Developments in Brick Pavements." A review of the developments in brick pavements in recent years. Issued by the National Paving Brick Association, National Press Building, Washington, D. C.

Pumps

121. New illustrated catalog and prices of Jaeger Sure Prime Pumps, 2" to 10" sizes, 7000 to 220,000 G.P.H. capacities, also Jetting, Caisson, Road Pumps, recently issued by The Jaeger Machine Company, 400 Dublin Ave., Columbus, Ohio.

122. CMC pump bulletin illustrates and describes complete line of modern centrifugals made in sizes from 1½" to 10" by Construction Machinery Co., Waterloo, Iowa.

123. New brochure by Gorman-Rupp Co., Mansfield, Ohio, illustrates and describes many of the pumps in their complete line. Covers heavy duty and standard duty self-priming centrifugals, jetting pumps, well point pumps, triplex road pumps and the lightweight pumps.

124. 16-page illustrated bulletin, SP-37, describes and illustrates complete C. H. & E. line of self-priming centrifugal pumps from ½" to 8", including lightweight models for easy portability. C. H.

& E. Mfg. Co., 3841 No. Palmer St., Milwaukee, Wis.

Retaining Walls

126. Charts showing the design of cellular or bin-type metal retaining walls, helpful suggestions on their use for stabilizing slopes, preventing stream encroachment, and solving problems of limited right of way, and construction details are given in a 16-page bulletin entitled, "ARMCO Bin-Type Retaining Walls." It is published by the Armco Drainage Products Association, Middletown, Ohio, and member companies. Ask for Bulletin H-37.

127. See road work as it was done in the 1890's and as it can be done by a full line of this year's road building equipment. See, in this new action picture book, the first reversible roller, 1893 World's Fair Award Grader and how methods have changed. Attractive new booklet AD-1796 recently issued by The Austin-Western Road Machinery Co., Aurora, Ill.

128. Motor Patrol Graders for road maintenance, road widening and road building, a complete line offering choice of weight, power, final drive and special equipment to exactly fit the job. Action pictures and full details are in catalogs Nos. 253, 254 & 255, issued by Gallion Iron Works & Mfg. Co., Gallion, Ohio.

129. New bulletins illustrate and describe the latest line of Littleford Utility Spray Tanks, Street Marking Units, Street Flushers and Kettles. Littleford Bros., 452 East Pearl St., Cincinnati, Ohio.

130. Toro patching rollers, tractors and mowers for parks, airports, estates, highways and golf courses are pictured and detailed in new illustrated booklet available from Toro Mfg. Co., Minneapolis, Minn.

Rollers

133. New Tu-Ton roller of simple construction for use in rolling sidewalks along highways, playgrounds and other types of light rolling is fully described in a bulletin issued by C. H. & E. Mfg. Co., 3841 No. Palmer St., Milwaukee, Wis.

135. "The Buffalo-Springfield line of road rollers (tandem, 3-wheel, and 3-axle) are described in the latest catalog issued by the Buffalo-Springfield Roller Co., Springfield, Ohio."

139. "Ironroller" 3 Axle Roller for extra smooth surfaces on all bituminous work. Booklet contains roller data and operation details. Hercules Co., Marion, Ohio.

Spreader

147. Jaeger Paving equipment, including Mix-in-Place Roadbuilders, Bituminous Pavers, Concrete Bituminous Finishers, Adjustable Spreaders, Forms, etc. — 4 complete catalogs of latest equipment in one cover, issued by The Jaeger Machine Company, 400 Dublin Ave., Columbus, Ohio.

Soil Stabilization

150. "High-Service, Low Cost Roads" is one of the newer booklets using an effective combination of picture and text to set forth the principals and advantages of road surface stabilization with calcium chloride. Complete, interesting and well illustrated. 34 pages. Sent by Solvay Sales Corp., 40 Rector St., New York, N. Y.

152. The Columbia Alkali Corporation, will be glad to furnish to anyone interested complete information dealing with Calcium Chloride Stabilized Roads. This literature contains many charts, tables and useful information and can be obtained by writing Columbia Alkali Div., Pittsburgh Plate Glass Co., 30 Rockefeller Plaza, New York City.

154. "Soil Stabilization with Tarvia" — An illustrated booklet describing The steps in the stabilization of roadway soil with Tarvia will be mailed on request by The Barrett Company, 40 Rector St., New York, N. Y.

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(Continued from page 63)

Tractors

159. "International Diesel TracTrac-Tors" is a 48-page catalog giving full details of TracTracTors, including action pictures with bulldozers, bullgraders, blade graders, wheel scrapers, elevating graders, etc. Sent promptly by International Harvester Co., 180 North Michigan Ave., Chicago, Ill.

Street and Paving Maintenance

Asphalt Heaters

198. Illustrated Bulletins 15 to 20 describe Mohawk Oil Burning Torches; "Hot-stuff" Tar and Asphalt Heaters; Portable Trailer Tool Boxes; Pouring Pots and other equipment for street and highway maintenance, roofing, pipe coating, water proofing, etc. Mohawk Asphalt Heater Co., Frankfort, N. Y.

Dust Control

210. "How to Maintain Roads with Dowflake" is a new 58 page illustrated booklet of information on stabilized road construction. Includes specifications and several pages of reference tables from an engineer's notebook. Issued by Dow Chemical Co., Midland, Mich.

211. A complete booklet on dust control titled, "Dust Control and Road Stabilization," describes the use of Columbia Calcium Chloride for dust control purposes and stabilization of roads. Sent on request by Columbia Alkali Div., Pittsburgh Plate Glass Co., 30 Rockefeller Plaza, New York, N. Y.

212. "Are You Annoyed by Dust?" an illustrated circular telling how to prevent dust with calcium chloride. Sent free by Michigan Alkali Co., 60 East 42 St., New York, N. Y.

Radio Communication, Two Way

250. Valuable information on how cities and towns all over the country have solved their radio communication problems is found in "Motorola Radio Communication Equipment." Write Galvin Mfg. Corp., 4545 West Augusta St., Chicago, Ill.

Street Markers

300. Street marking simplified by the use of modern, self-contained units capable of handling any kind of striping jobs is the subject of an illustrated bulletin giving also full details of new M-B Street Markers. Sent by Mell-Blumberg Corp., Box PW, New Holstein, Wis.

Snow Fighting

Plows

350. "Frink One-Way Sno-Plows" is a four page catalog illustrating and describing 5 models of One-Way Blade Type Sno-Plows for motor trucks from 1½ up to 8 tons capacity. Interchangeable with V Sno-Plow. Features, specifications and method of attaching. Carl H. Frink, Mfr., Clayton, 1000 Islands, N. Y.

Ice Control

351. "Make Icy Highways Safe for Traffic"—a new bulletin by Michigan Alkali Co., 60 East 42 St., New York, N. Y., tells how to use calcium chloride for modern ice control.

Sanitary Engineering

Activated Alum

354. "Technical Data on Activated Alum and Dustless Blackalum" points out the analytical side of Activated Alum and Blackalum. Write Activated Alum Corp., Curtis Bay, Baltimore, Md.

Aero-Filter

356. New illustrated bulletin gives complete information on design of Aero-Filters to provide high-capacity, uniform, raindrop application over the entire filter bed. Write Lakeside Engineering Corp., 222 West Adams St., Chicago, Ill.

Air Release Valves

357. Automatic Air Release Valves for water, sewage and industrial uses are

described and illustrated in new catalog issued by Simplex Valve & Meter Co., 6750 Upland St., Philadelphia, Pa.

Analysis of Water

360. "Methods of Analyzing Water for Municipal and Industrial Use" is an excellent 94 page booklet with many useful tables and formulas. Sent on request by Solvay Sales Corp., 40 Rector St., New York, N. Y.

Activation and Aeration

376. A valuable booklet on porous diffuser plates and tubes for sewage treatment plants. Covers permeability, porosity, pore size and pressure loss data, with curves. Also information on installations, with sketches and pictures, specifications, methods of cleaning and studies in permeability. 20pp. illustrated. Sent on request to Norton Company, Worcester, Mass.

Cleaning Mains

381. "Let's Look Into the Matter of Water Main Cleaning" is an illustrated booklet outlining the advantages of water main cleaning and explains how it can be done quickly and inexpensively by The National Method. Write National Water Main Cleaning Co., 30 Church St., New York, N. Y.

Cleaning Sewers

383. A 20-page booklet describes and illustrates a full line of sewer cleaning equipment—Rods, Root Cutters, Buckets, Nozzles and Flushers. Write W. H. Stewart (Pioneer Mfr. since 1901), Jacksonville, Fla., or P. O. Box 767, Syracuse, N. Y.

384. A new 32-page, illustrated booklet explains how a city can clean its sewers and culverts with its own forces using the up-to-date Flexible Sewer Rod equipment. Illustrates and describes all necessary equipment. Issued by Flexible Sewer Rod Equipment Co., 9059 Venice Blvd., Los Angeles, Calif.

Corrosion Prevention

385. Enamels and coatings to protect pipe lines, sewage plant structures and equipment against corrosion. Recommendations for any problem. Walles Dove-Hermiston Co., 17 Battery Place, New York, N. Y.

Feeders, Chlorine, Amonia and Chemical

387. For chlorinating water supplies, sewage plants, swimming pools and feeding practically any chemical used in sanitation treatment of water and sewage. Flow of water controls dosage of chemical; reagent feed is immediately adjustable. Starts and stops automatically. Literature from % Proportioners, Inc. % 96 Coddling St., Providence, R. I.

Filter Bed Agitator

388. 60-page booklet, "The Mechanics of Filter Bed Agitation," containing engineering data, technical information concerning surface wash and opinions of users will be sent promptly by Activated Alum Corp., Curtis Bay, Baltimore, Md.

Filter Plant Controllers

389. "The Modern Filter Plant" and the uses of Simplex Controllers for operation are described in a handy, 16-page booklet. Charts, data, curves and tables. Simplex Valve and Meter Co., 6750 Upland St., Philadelphia, Pa.

Fire Hydrants

390. Specifications for standard AWWA fire hydrants with helpful instructions for ordering, installing, repairing, lengthening and use. Issued by M. & H. Valve & Fittings Co., Anniston, Ala.

391. See listing No. 410.

Flow Meters

393. The primary devices for flow measurement—the orifice, the pilot tube, the venturi meter and others — and the application to them of the Simplex meter are described in a useful 24-page booklet (42A). Simplex Valve and Meter Co., 6750 Upland St., Philadelphia, Pa.

Gates, Valves, Hydrants

394. Gate, flap and check valves; floor stands and fittings. New catalog No. 34 gives detail information with dimensions for all types of new full line. M. & H. Valve & Fittings Co., Anniston, Ala.

395. Complete booklet with much worthwhile water works data describes fully Ludlow hydrants and valves. Sent on request. Ludlow Valve Mfg. Co., Troy, N. Y.

396. See listing No. 410.

Gauges

398. The full line of Simplex gauges for filtration plants are illustrated and described in catalog issued by Simplex Valve and Meter Co., 6750 Upland St., Philadelphia, Pa.

Hypochlorinators

400. New illustrated booklet W&T 357 describes this simple, inexpensive means of protecting small water supplies such as summer camps, hotels, swimming pools, dairies, etc., as well as for feeding chemical solutions in the water works plant. Contains typical installation sketches. Write "Wallace & Tiernan Co., Inc., Newark, N. J.

Manhole Covers and Inlets

402. Street, sewer and water castings in various styles, sizes and weights. Manhole covers, water meter covers, adjustable curb inlets, gutter crossing plates, valve and lamphole covers, ventilators, etc. Described in catalog issued by South Bend Foundry Co., Lafayette Blvd. and Indiana Ave., South Bend, Ind.

Manhole Cover Silencers

403. New bulletin on Tapax for quickly ending noisy manhole covers and small sample free. Write Tapax Mfg. Co., 201 Hoyt Ave., Mamaroneck, N. Y.

Meters, Venturi

405. MS Meters for use with venturi tubes, flow nozzles, etc., in wall, panel, or floor mounting are covered in detail in catalog sent free by Simplex Valve & Meter Co., 6750 Upland St., Philadelphia, Pa.

406. New bulletin illustrates Builders Air Relay system of transmission for the Venturi Meter which is particularly useful for liquids containing suspended solids like sewage. Eliminates corrosion, clogged pipes, etc. Write Builders Iron Foundry, Coddling St., Providence, R. I.

Meters, Water

407. Complimentary bulletin W529 tells all about Pittsburgh IMO water meters, "the meters that wear in where others wear out." Write Pittsburgh Equitable Meter Co., Pittsburgh, Pa.

Pipe, Cast Iron

408. Handbook of Universal Cast Iron Pipe and Fittings, pocket size, 104 pages, illustrated, including 14 pages of useful reference tables and data. Sent by The Central Foundry Co., 386 Fourth Ave., New York, N. Y.

409. Cast iron pipe and fittings for water, gas, sewer and industrial service. Super-deLavaud centrifugally-cast and pit-cast pipe. Bell-and-spigot, U. S. Joint, flanged or flexible joints can be furnished to suit requirements. Write U. S. Pipe and Foundry Co., Burlington, N. J.

410. "Cast Iron Pipe and Fittings" is a well illustrated 44 page catalog giving full specifications for their complete line of Sand Spun Centrifugal Pipe, Fire Hydrants, Gate Valves, Special Castings, etc. Will be sent promptly by R. D. Wood Co., 400 Chestnut St., Philadelphia, Pa.

Pipe Forms

411. Making concrete pipe on the job to give employment at home is the subject of a new booklet just issued by Quinn Wire and Iron Works, 1621 Twelfth St., Boone, Ia., manufacturers of "Heavy Duty" Pipe Forms. Sent promptly on request.

Pipe, Reinforced Concrete

412. Literature describing the manufacture and installation of Lock Joint Reinforced Concrete Pressure Pipe for water supply lines and sewer force mains. Lock Joint Pipe Co., Ampere, N. J.

Pipe, Transite

413. Two new illustrated booklets, "Transite Pressure Pipe" and "Transite Sewer Pipe" deal with methods of cutting costs of installation and maintenance of pipe lines and summarize advantages resulting from use of Transite pipes. Sent promptly by Johns-Manville Corp., 22 East 40th St., New York, N. Y.

Pipe Joints, Sewer

415. How to make a perfect sewer pipe joint—tight, prevents roots entering sewer, keeps lengths perfectly aligned; can be laid with water in trench or pipe. General instructions issued by L. A. Weston, Adams, Mass.

Pipe, 2-inch Cast Iron

417. The new McWane 2" cast iron

pipe in 18-foot lengths has innumerable uses in water and sewage work. Send for the new McWane bulletin describing this pipe, the various joints used, and other details about it. McWane Cast Iron Pipe Co., Birmingham, Ala.

Pumps and Well Water Systems

420. Installation views and sectional scenes on Layne Vertical Centrifugal and Vertical Turbine Pumps fully illustrated and including useful engineering data section. Layne Shutter Screens for Gravel Wall Wells. Write for descriptive booklets. Advertising Dept., Layne & Bowler, Inc., Box 186, Hollywood Station, Memphis, Tenn.

Meter Setting and Testing

430. The most complete catalog we have seen on setting and testing equipment for water meters—exquisitely printed and illustrated 48-page booklet you should have a copy of. Ask Ford Meter Box Co., Wabash, Ind.

Recarbonation

431. Bulletin describes stabilizing lime-softened water by recarbonation, discussing gas production, washing, compressing, drying, and applying the CO₂. International Filter Co., 325 West 25th Place, Chicago, Ill.

Sand Expansion Indicator

432. New bulletin gives full details of Simplex Sand Expansion Indicators for water plants. Write Simplex Valve & Meter Co., 6750 Upland St., Philadelphia, Pa.

434. Be assured of uninterrupted, constant automatic removal of screenings. Folder 1587 tells how. Gives some of the outstanding advantages of "Straightline Bar Screens" (Vertical and Inclined types). Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill.

Steel Sheet Piling

435. Steel sheet piling to speed sewer jobs is covered in illustrated catalog containing complete production specifications. Write Dept. PW-2, The Union Metal Mfg. Co., Canton, Ohio.

436. "Metal Sheeting for Lower Average Job Costs" is a new bulletin about light weight sheeting you can use again and again. Issued by Armco Drainage Products Assn., Middletown, Ohio.

Sewers

437. "ARMCO Sewers" is the title of a 48-page booklet describing the structural and other advantages of ARMCO Ingot Iron. Paved Invert and Asbestos-Bonded pipe for storm and sanitary sewers. Design data and large charts will be found helpful by engineers engaged in the design or construction of sewers. Copies will be sent on request by the Armco Drainage Products Association, Middletown, Ohio, or its associated member companies.

Septic Tanks, Small

438. Septic Disposal Systems, Waterless Toilets, Multiple Toilets for Camps and Resorts, and other products for providing safer sewage disposal for unsewered areas are described and illustrated in data sheets issued by San-Equip Inc., 504 E. Glen St., Syracuse, N. Y.

Sludge Drying and Incineration

440. "Disposal of Municipal Refuse." Complete specifications and description including suggested form of proposal; form of guarantees; statements and approval sheet for comparing bids with diagrammatic outline of various plant designs. 48 pages. Address: Morse Boulder Destructor Co., 216-P East 45th St., New York, N. Y.

441. Full information about Nichols modern, efficient garbage and refuse incinerators now available in the Basket Grate, Continuous Grate, Revolving Grate and Monohearth types will be sent promptly by Nichols Engineering and Research Corp., 60 Wall Tower, New York, N. Y.

442. Recuperator tubes made from Silicon Carbide and "Fireclay" Corebustors for maximum efficiency are described and illustrated in bulletin No. 11 issued by Fitch Recuperator Co., Plainfield National Bank Bldg., Plainfield, N. J.

443. Nichols Herreshoff incinerator for complete disposal of sewage solids and industrial wastes—a new booklet illustrates and explains how this Nichols incinerator works. Pictures recent installations. Write Nichols Engineering and Research Corp., 60 Wall Tower, New York, N. Y.

Swimming Pools

446. Data and complete information on swimming pool filters and recirculation plants; also on water filters and

filtration equipment. For data prices, plans, etc., write Roberts Filter Mfg. Co., 640 Columbia Ave., Darby, Pa.

447. 40-page Manual on swimming pools. Includes swimming and pool layouts, specifications, etc., and details concerning Permit Swimming Pool Equipment. Write The Permutit Co., Dept. G-4, 330 West 42 St., New York, N. Y.

Taste and Odor Control

450. Technical pub. No. 207 issued by Wallace & Tiernan Co., Inc., Newark, N. J., describes in detail taste and odor control of water with BREAK-POINT Chlorination, a method of discovering the point at which many causes of taste may be removed by chlorination with little or no increase in residual chlorine. Sent free to any operator requesting it.

452. "Water and Sewage Chemistry" is the title of a valuable booklet for the operating man, reprinted from PUBLIC WORKS Magazine for December, 1940, by General Chemical Co., 40 Rector St., New York, N. Y.

Treatment

453. "Safe Sanitation for a Nation," an interesting booklet containing thumbnail descriptions of the different pieces of P.F.T. equipment for sewage treatment. Includes photos of various installations and complete list of literature available from this company. Write Pacific Flush Tank Co., 4241 Ravenswood Ave., Chicago, Ill.

455. New booklet (No. 1642 on Link-Belt Circuline Collectors for Settling Tanks contains excellent pictures; drawings of installations, sanitary engineering data and design details. Link-Belt Company, 2045 W. Hunting Park Ave., Philadelphia, Pa.

456. New 16-page illustrated catalog No. 1742 on Straightline Collectors for the efficient, continuous removal of sludge from rectangular tanks at sewerage and water plants. Contains layout drawings, installation pictures, and capacity tables. Address Link-Belt Co., 2045 West Hunting Park Ave., Philadelphia, Pa.

457. New illustrated folder (1942) on Straightline apparatus for the removal and washing of grit and detritus from rectangular grit chambers. Address: Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.

458. "Sedimentation with Dorr Clarifiers" is a complete 36-page illustrated catalog with useful design data. Ask The Dorr Company, 570 Lexington Ave., New York, N. Y.

459. A combination mechanical clarifier and mechanical digester, The Dorr Clarigester, is explained and illustrated in a bulletin issued by The Dorr Company, 570 Lexington Ave., New York, N. Y.

460. This new 145 page illustrated chemical products book contains 55 pages of Tables, Factors and valuable Reference Data. Issued by General Chemical Co., 40 Rector St., New York, N. Y.

461. Preflocculation without chemicals with the Dorco Clariflocculator in a single structure is the subject of a new booklet issued by The Dorr Company, 570 Lexington Ave., New York, N. Y.

462. Dorco Monorake for existing rectangular sedimentation tanks, open or closed, is described and illustrated in a new catalog sent on request. The Dorr Co., 570 Lexington Ave., New York, N. Y.

Tunnel Liners

480. "Save Money with Armco Light Duty Tunnel Liner" is a bulletin you'll want if you are interested in economical, long lasting tunnels. Write Armco Drainage Products Assn., Middletown, Ohio.

Valves (See Gates, Air Release, etc.)

Water Works Operating Practices

490. "Important Factors in Coagulation" is an excellent review with bibliography and outlines of latest work done in the field. Written by Burton W. Graham and sent free on request to Activated Alum Corp., Curtis Bay, Baltimore, Md.

491. "Soft Water for Your Community" tells by means of many interesting pictures and text the advantages of soft water to any community. Ask for a copy from The Permutit Co., Dept. G4, 330 West 42nd St., New York, N. Y.

492. "Alkalies and Chlorine in the Treatment of Municipal and Industrial Water" is a new comprehensive survey filled with tables, charts, cost comparisons, etc., valuable to all who treat large volumes of water. Write Solvay Sales Corp., 40 Rector Street, New York City.

Water Service Devices

500. Data on anti-freeze outdoor drinking fountains, hydrants, street washers, etc., will be sent promptly on request to Murdock Mfg. & Supply Co., 426 Plum St., Cincinnati, Ohio.

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THREE-TON Roller

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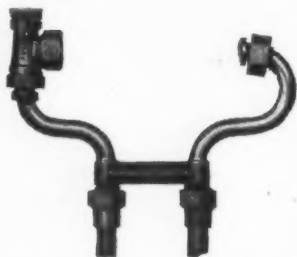
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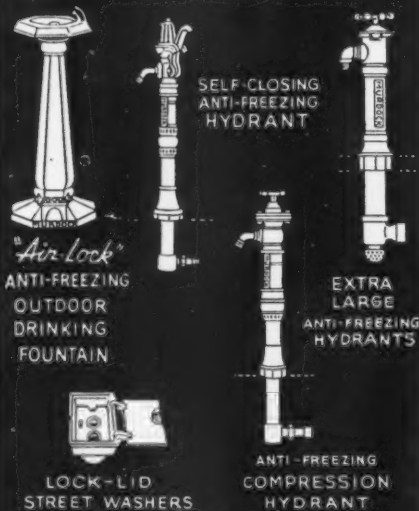
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For the Engineer's Library

Brief reviews of the latest books, booklets and catalogs for the public works engineer.

ACTIVE CARBON, THE MODERN PURIFIER. By John W. Hassler, Fourth Edition. 158 pages, 25 ills. Industrial Chemical Sales Division, West Virginia Pulp and Paper Co.

This text deals primarily with the so-called decolorizing type of activated carbon, such as engineers are familiar with through use in water and sewage treatment. It covers the general field of use under six main headings. Chapter 1 discusses the history and development of use of carbon and the methods of application. Chapters 2 to 13 describe the particular application of activated carbon to industry—sugars and sirups; oils, fats and waxes; other food products; water; alcoholic beverages; chemicals, pharmaceuticals and petroleum products; reclamation; waste treatment, including sewage; air conditioning; biological and physiological chemistry; catalysis, and miscellaneous uses. Chapters 14, 15 and 16 review certain basic principles for the benefit of the research chemist. Chapter 17 discusses methods of evaluating carbons. Chapter 18 is the most complete and valuable bibliography on activated carbon and its uses that this reviewer has ever seen, comprising 44 pages. The final division describes the various qualities of Nuchar carbon and their applications.

The bibliography omits the list of references to water treatment, stating that these will be published separately.

The material in this book is not designed to help the water works or sewage engineer or superintendent solve his detail problems, but it will give him a brief summary of accomplishments and methods; and it is valuable in providing a broader view of an important sanitary engineering industry.

This book will be sent free to scientific, technical and educational organizations and to consulting and industrial research laboratories.

G-E Turbine Book

General Electric Co.,
Schenectady, N. Y.

A 78-page book completely describing General Electric's turbine-generators in ratings from 500 to 7500 kilowatts has just been published by the company. Designated GEA-3277-1, the new publication contains photos and charts which show the major steps in the manufacture of turbine-generator units. Sectional views of turbines, valve mechanisms, interconnecting mechanisms, generators, exciters and ventilation are given, as well as detailed sketches of various turbine types—straight condensing and noncondensing, condensing single and double extraction, noncondensing single and double extraction, and superposed. Reference charts of turbine steam rates are also included.

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